# Expanding Access to Schooling in Nigeria: Impact on Marital Outcomes - EARLY STAGE DRAFT - DO NOT CIRCULATE

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**Abstract**

The paper examines the effect of human capital acquired in primary school by men and on women on their marital outcomes in Nigeria. To identify the effects of education we use a difference in difference design that exploits variations across local government areas and gender in the intensity of the Universal Primary Education program implemented from 1976 to 1981. We disentangle the impact of men's education from women's education on partners' marital outcomes by leveraging the 10-year average age difference between partners in Nigeria. We find that women's education is the key driver to delay entry into marital life and motherhood and is also negatively correlated with polygamy, and experience of physical domestic violence. Decreasing support to harmful norms like tolerance of IPV and emotional violence by the partner require however that women are more educated and exposed to more educated husbands, suggesting that they have a key role in shaping their wife's opinion and well-being. We will anchor our work in a structural model to account for the impact of assortative matching on the results.

***JEL* Classification: I25, J12.**
**Keywords: Education, Marriage, Intimate Partner Violence, Women, Sub-Saharan Africa.**

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# Introduction

A rich literature on Western countries shows that who women marry plays a significant role in the access to resources and in the reproduction of inequalities (*inter alia* Becker [1973], Chiappori et al. [2009]). The literature on developing countries is rather scarce whereas the role of marriage in womens lives is even more critical for womens access to resources than in Western countries. It is especially true in sub-Saharan Africa where female celibacy is stigmatized, where women's access to the labor market is constrained, and where there is a lack of safety nets outside of the family.

The literature has shown that education of partners plays a determinant role in who marries whom. Between the African independences and the 2000s, nearly all sub-Saharan African countries have implemented programs to increase the overall level of education in their population. Countries followed a similar blueprint that consisted in a massive investment in school supply. Nigeria, the most populated country in sub-Saharan Africa was no exception and implemented in the 1970s the Universal Primary Education (UPE) program. The UPE is one of the largest education program ever carried out in sub-Saharan Africa with an investment in school supply of 700 million naira (Osili and Long [2008]). Despite this massive push in school supply, the literature showed that the returns to education on the labor market were modest (Oyelere [2010]). However, education also brings returns on the marriage market that have been seldom studied in this context.

The paper documents the impact of the UPE on marriage market matching in Nigeria, and how it impacts marital outcomes of men and women. We assess the causal impact of the UPE program on marital outcomes with a difference-in-difference (DID) approach. We exploit the geographical variation in the intensity of the UPE program and the exposure of individuals to the UPE program based on their age. In order to disentangle the impact of the education of the husband from the education of the wife

on marital's outcomes, we leverage a stylized feature of the Nigerian marriage market; the age difference between partners. On average, wives are ten years younger than their partner, which allows us to compare couples where none of the partners are exposed to the UPE, couples where only the wife is exposed to the UPE, and couples where both husband and wife are exposed to the UPE. We apply the latest recommendations of the literature and anchor the study of the change in matching patterns caused by the policy in a structural model.

We show that the UPE was successful in increasing men and women's attendance to both primary and secondary school. When it comes to marital outcomes, the UPE is linked to changes in marital patterns, notably by decreasing homogamy in education among the least educated, and by increasing it among partners with the highest level of education. Homogamy among partners who both attended primary school also increases for women exposed to more educated husbands. The UPE is associated with a decrease in unions in which the husband is more educated than the wife but the decrease seems partially offset for women who are exposed to more educated husband in addition to being more educated themselves. We also find evidence that the UPE is positively associated with an increase in unions where the wife is more educated than the husband.

We also find that the UPE has no effect on men's age at marriage, age at first child, or on the probability to be polygamous. The impact of the UPE on decision-making reported by men in the household is ambiguous: the UPE is positively linked to the the propensity that men decide on their own how to spend their wife's earnings. Being more educated themselves however offsets this effect. We find that exposure to the UPE through their own schooling in addition to being exposed to more educated wives is negatively associated with men declaring to be the sole decisioner on the number of children to have.

As for women, the results show that to entry into marital life, and entry into motherhood are delayed when providing education to women, and being exposed to more educated men yields no additional benefits. The UPE is negatively correlated with women's probability to be in a polygamous union but being exposed to more educated women in addition to being more educated themselves slightly offsets the decrease.

We find that the effect of women's own education may matter more than the huband's education to improve women's say in decision-making in the household. However, for tolerance of IPV, it is the opposite; being married to a more educated man seems to be key as exposure to more educated husbands is negatively associated with the tolerance of IPV. The impact of the UPE on experience of IPV seems to vary according to the type of IPV; the intensity of the controlling behavior of the partner and the experience of severe physical violence is negatively correlated with the UPE and being exposed to a more educated husband does not seem to further mitigate exposure to this type of IPV. However, the probability to experience control and to experience emotional violence are negatively associated with the UPE among women who are exposed to potential husbands who are more educated. In a subsequent version of this work, we will use a structural model to derive a causal interpretation of the estimates.

We contribute to the literature by enriching the evidence provided by a previous study of the impact of the UPE on fertility (Osili and Long [2008]). We are able to disentangle the impact of the women's education from men's education on marital outcomes. We also take advantage of the wider set of information available on marital outcomes in the more recent DHS datasets whereas Osili and Long [2008] could not as it is only using the 1999 DHS wave. The DHS also provides more information on the individual characteristics of men and women that we will use in the structural model to go beyond André and Dupraz [2019] that mainly focuses on education, age, and polygamy as determinants of matching. In addition, we use information at the LGA level which is a more granular

level of analysis than the regional level exploited by Osili and Long [2008].

The paper is organized as follows: Section 1 provides context on education in Nigeria and on the UPE and Section 2 describes the data. Section 3 provides elements on the Nigerian marriage market and Section 4 describes the empirical strategy. Section 5 describes the results and Section 6 concludes.

# 1 Overview of the UPE and education in Nigeria

## 1.1 Overview of education in Nigeria prior to the UPE

Nigeria is a federation currently divided in 36 states and 774 Local Government Areas (LGA). Prior to independence from the UK in 1960, Nigeria was divided in three administrative units: the Northern region, predominantly Muslim, the Eastern region, which is Christian, and the Western region that was mixed in terms of religious groups. There were substantial imbalances in education across regions in the 1960s and at the beginning of the 1970s; the population in the Eastern and Western regions were more educated as they benefited from the implementation of Christian missions during the colonization era and then from the first initiatives to promote universal primary education. It was especially true in the Western region that was at the forefront of progress in education. They were less Western-style schools in the North, in part because the British colonizer did not wish to interfere with Northern local leaders. Public primary school was co-ed pre-1976.

Before the implementation of the UPE in 1976, according to the DHS data, 55% of the population born between 1960 and 1965 had not completed primary school and had attended school for five years on average. These figures mask discrepancies by gender, as the 39% of men had not completed primary school whereas 65% of women had not

completed primary school, and the average years of education of a man was 7 years versus 4 years for a woman.

Figure 1 shows the share of respondents born 1955 to 1965 who had not completed primary school by LGA and by gender. It confirms that there was variation by gender in the share of people who had not completed primary school, and some geographical variation as well.

## 1.2 The Nigerian UPE program

The Nigerian UPE is the first initiative that tried to increase primary education nationwide in a consistent manner. It was launched in 1976 with the stated objective of the military junta to have the Northern and Eastern regions catch up with the Western regions of Nigeria in terms of primary education. The UPE was based on three pillars: a tuition-free public primary education at the national level,[1] a massive push in public school constructions - the number of classrooms built was multiplied by 1.4 compared to the 1965 level, and an investment in teacher training. The last pillar however lagged behind the first two, and there is even evidence of a decrease in school quality as a result (Asagwara [1997], Csapo [1983]). Consistently with the objective of having regions lagging behind in terms of education catch up with the Western regions, prior literature shows that more resources and efforts were directed to areas with lower levels of primary school enrollment before the beginning of the UPE (Osili and Long [2008], Larreguy and Marshall [2017]). The program also harmonized primary school length at the national level; it was decided that pupils would enter primary school at six years old for a duration of six years.

The UPE program led to a substantial increase in primary school enrollment. Ac-

[1]Public primary school was free in the Western regions since 1955.

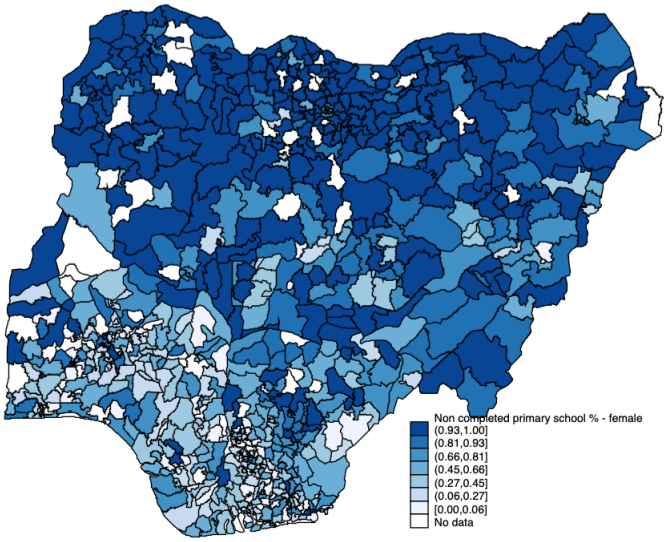
cording to the WB figures, gross primary enrollment rate for boys went from 60% in 1974 to 137% in 1981 and gross primary enrollment rate for girls went from 40% in 1974 to 105% in 1981. Table 1 shows that the share of uneducated women went from 63% among women born between 1955 and 1965 to 37% among women born between 1985 and 1995. For men, the uneducated represented 37% of the cohort born between 1955 and 1965, and represented 24% of the cohort born between 1985 and 1995. There was a faster increase in enrollment regions with lower baseline enrollment, which are the one that received more funds from the federal government. Because the number of new pupils vastly exceeded the previsions of the military government, and because the increase in oil prices that funded the UPE ended, the free tuition leg of the program was stopped in 1981 (but generalized free primary school was reinstated in 1990). Despite the end of free tuition, the effects of the program seem to have been sustained after it ended; figure 2 show that change in the share of female and male that completed primary education by cohort of birth in LGAs where more funds were invested because enrollment was lower (high-intensity areas) and in LGAs where less funds were invested because enrollment was higher before the UPE (low-intensity areas).

Table 1: Share of women and men who did not complete primary school before and after the UPE at the LGA level

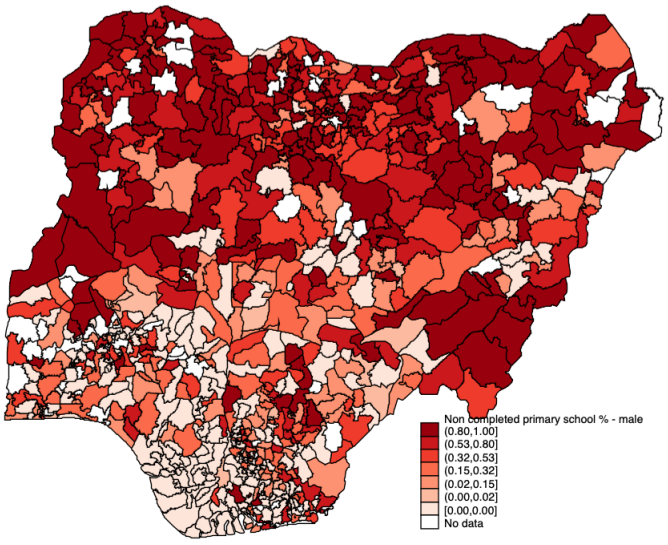
| VARIABLES | mean | median | sd | min | max |
|---|---|---|---|---|---|
| uneducated women born born 1955-65 | 0.63 | 0.73 | 0.36 | 0 | 1 |
| uneducated women born born 1985-95 | 0.37 | 0.20 | 0.37 | 0 | 1 |
| uneducated men born 1955-65 | 0.37 | 0.24 | 0.38 | 0 | 1 |
| uneducated men born 1985-95 | 0.24 | 0.081 | 0.31 | 0 | 1 |

**Source**: DHS Nigeria.

Figure 1: Share of respondents born 1955 to 1965 who had not completed primary school by LGA

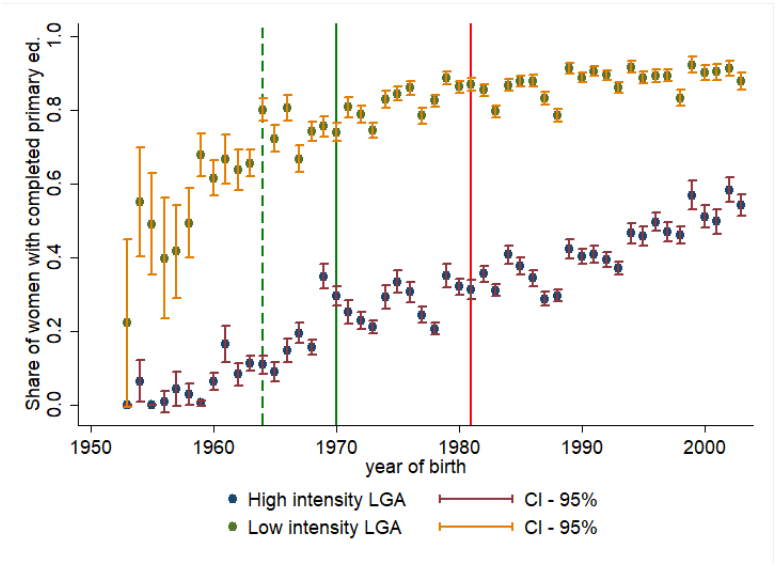



(1) Female

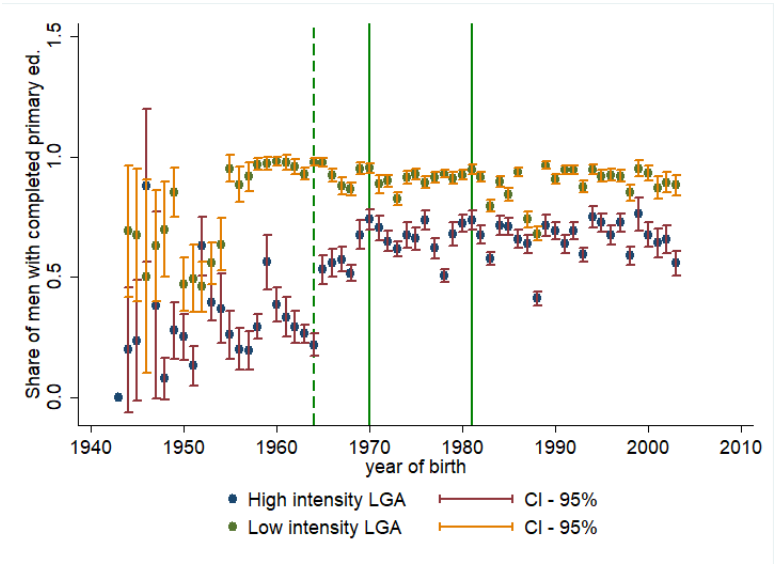



(2) Male

Figure 2: Completed primary schooling by birth cohort - women




(a) Female




(b) Male

**Note**: Samples: panel (a): women born between 1953 and 2003, panel (b): men born between 1943 and 2003. The intensity of the treatment is given by the share of women (men) born between 1960 and 1965 and who had not completed primary school. High intensity areas are the LGAs where the share of women (men) who had not completed primary school is above the median of the intensity, and low intensity areas are the LGAs the share of women (men) who had not completed primary school is below the median.

**Source**: DHS Nigeria 2003, 2008, 2013, and 2018.

# 2 Data

The main data source is the geolocalized Demographic and Health Surveys (DHS) for Nigeria. We pool the survey waves of 2003, 2008, 2013, and 2018 and we correct the survey weights to account for the pooling of the waves by using the program written by Crespin-Boucaud [2020]. The DHS collects information on women aged 15-49 years old in a harmonized fashion across space and time. Depending on the survey wave, a third or a half of men aged 18 to 59 years old living in eligible households are also surveyed. We use the geolocalization of the DHS surveys to match the location of a DHS cluster to one of the 774 local government areas (LGA) of Nigeria. In order to maintain confidentiality, the DHS Program randomly displaces the latitude and longitude of the survey clusters. They are moved by 0 to 2 kilometers in urban areas and rural clusters are displaced by 0 to 5 kilometers, with 1% of them being moved by up to 10 kilometers. The displacement rule introduces some random measurement error in the data, which is known to lead to an attenuation bias.

The DHS collects information on men and women's level of education, on whether women and men are married at the time of the survey, on their age at first union, their age at first child, on whether they tolerate intimate partner violence (IPV), on whether they have a say in decision-making in the household, and on their experience of IPV. We use these variables to proxy marital outcomes in the analysis.

**Education** The main explanatory variable, education, is a categorical variable based on the respondent report of its own level of education. It classifies the respondent's level of education as follows: no primary education, attended primary school, completed primary school, attended secondary school, completed secondary school, attended higher education. For married women and men, the respondent is also asked about the level of

education of the wife or husband. We also use the number of years of education declared by the respondent.

**Tolerance of IPV** The DHS collects data on women's tolerance of IPV. All women, whether they are married or not, are asked whether they believe it is accceptable for a husband to beat his wife if she (i) goes out without telling, (ii) argues with him, (iii) neglects the children, (iv) refuses to have sex with him, or (v) burns the food. We use each binary response to the five different scenarios as outcome variables and we build an index using a principal component analysis (PCA) and retaining the first loading factor.

**Experience of IPV** The surveys includes a module on the experience of IPV. It is answered by a subsample of ever-partnered women. For safety reasons, one eligible women per household is randomly selected to answer the IPV module. It provides measures of the controling behavior of the partner, of emotional violence and of physical violence. Controling behavior is measured using a series of five questions: (i) is the respondents partner jealous if she speaks to other men, (ii) does he accuse her of being unfaithful, (iii) does he prevent her from meeting her female friends, (iv)does he try to limit her contact with her family, and (v) does he insist on knowing where she is. We use a binary variable indicating whether a respondent experienced a controling behavior, and we use a 1 to 5 scale that counts the number of items of control reported by the respondent. Information about the controling behavior of the partner is collected in all the survey waves.

Emotional violence is measured with a binary variable equal to 1 if the parner ever has humiliated the respondent, threatened the respondent with harm or insulted the respondent. Physical violence and marital rape are measured with a single binary variable equal to 1 if the respondent has ever been slapped, kicked, punched, strangled, threatened with a weapon or has ever been forced to have sex with her partner when she did not want to.

Information on emotional violence, physical violence and marital rape is available in the 2008, 2013, and 2018 survey waves.

We compute an index of experience of IPV using a PCA based on experience on control, emotional, physical violence, and marital rape and we retain the first loading factor.

**Decision-making in the household** In the DHS, women report who usually decides in the household (i) on their own healthcare decisions, (ii) on large household purchases, (iii) on visits to family or relatives, and (iv) on what to do with the money the husband earns. Questions (i), (ii), (iii) are available in all the survey waves, whereas question (iv)is available in the 2008, 2013, and 2018 waves. The answers to whom decides in the household can either be the respondent alone, the husband and the respondent jointly, the husband alone, or someone else in the household. For female respondents, we build a binary variable to indicate whether the respondent has some say in the decision making (alone or jointly with the husband).

Male respondents report who usually decides in the household (i) on large household purchases, (ii) on purchases for daily needs, (iii) on visits to family or relatives, (iv) on the money the wife earns, and (v) on the number of children. All questions are available in the 2003 and 2008 survey waves. In the 2013 and 2018 survey waves, only questions on who decides on the purchases for daily needs was asked. A binary variable indicating whether the husband reports that he is the sole decisioner on the items described.

# 3 The Nigerian marriage market

In Nigeria, as in most West African countries, marriage is an unescapable step in a woman's life. Marriage is a social obligation and an economic necessity (Riss [1985]). Marriage can be seen as a negotiation between two families spearheaded by the male heads of household especially in Nigeria in the 1980s. Even though women and men may have some say in the choice of the partner, the union ultimately has to be sanctioned by both families.

Table 2 shows that on average women in our sample get married at nearly 19 years old whereas men get married at 26 years old. 39% of women in our sample are married to a polygamous partner. Figure 3 displays the marital rates by age (at the time of the survey), education, and gender. The graph on the left-hand side provides marital rates by age and education for women and the graph on the right-hand side provides marital rates by age and education for men. The graph for women shows that women mainly get married between the age of 15 and 25, and that education seems correlated with delaying entry into marriage, as more educated women marry at a later age. For instance, at 20 years old, 82% of women with no formal education are married, 70% of women who have attended primary school are married, 38% of women who attended secondary education are married, and 0.5 of women who have attended education are married. As for men, the right-hand side graphs suggests that they mostly marry between 20 and 35 years old. As they tend to get married at later ages than women, education is less correlated with delaying marriage among men.

A key feature of the Nigerian marriage market is the age difference between partners, which is on average of 10 years. As shown by figure 4, the distribution of the average age difference between partners is stable across cohorts of women. Figure 5 provides a detailed map of how cohorts of women and men are matched in our sample. Women

and men are divided in cohorts of birth of 4 years and the graph shows the frequency of unions between two cohorts. The bigger and the lighter the square, the more frequent the unions between two cohorts. Overall, it confirms that women tend to marry men who are older than them, and who tend to belong to the two five-year age group immediately above theirs. For instance, women born between 1980 and 1984 are more likely to be married with men born between 1975 and 1979, and then with men born between 1970 and 1974.

As shown in Figure 6, most unions occur between partners with the same level of education (60% on average). This share decreases for women born between 1955 to 1980, and then increases for the youngest cohorts. Female hypergamy, i.e. unions where the husband is more educated than the wife, is the second more frequent case (27% on average) and appears to have slightly increased over time. The share of unions between a wife more educated than the husband is the lowest at 11% and seems stable. Figure 7 provides a detailed view of the change in homogamy in the education of partners; while the share of equally uneducated partners has decreased over time, the share of partners who both have some secondary education has risen. The share of couples where both partners have some primary education and some higher education seems to remain stable. Figure A.2 in the Appendix describes patterns of exogamy in education over time. Figure 8 compares the education of the husband of women according to the level of education of the wife across cohorts. Education of partners is divided into uneducated (U), has some primary education (P), has completed primary education (CP), has some secondary education (S), has completed secondary education (CS), and has some higher education (HE). The education profile of the husbands of women who have no formal education seems stable across cohorts. The younger cohort of women who have some primary education however, seem to have married husbands who went to secondary school more often than women belonging to the older cohort. This pattern of increased female hypergamy across cohorts is also displayed by women who have completed completed primary school (more

frequently in union with husbands who attended or completed secondary education), and by women who have attended secondary school; they are more frequently in union with husbands who completed secondary education and less frequently married to husbands who had completed primary school. In the younger cohort, women who have completed secondary school seem to marry men with the same level of education more often than the older cohort did. As for women with some higher education, they seem equally likely to mary a man with the same level of education as theirs across cohorts. However, they are less often married to men who completed primary school and more often married to men who completed secondary school.

To assess whether there is assortative matching on education occuring on the Nigerian marriage market, we compare the observed share of homogamous marriage to what would happened if the match happened randomly. [TBC]

The section focuses on matching on age and education and we are aware of the other dimensions on which matching may occur, notably the ethno-linguistic group and the religious group. We refer to Crespin-Boucaud [2020] that uses the DHS to document interethnic and interfaith marriage patterns in sub-Saharan Africa. She shows that in 2003 in Nigeria, the share of interethnic marriages was lower than 10%, and so was the share of interfaith marriages.

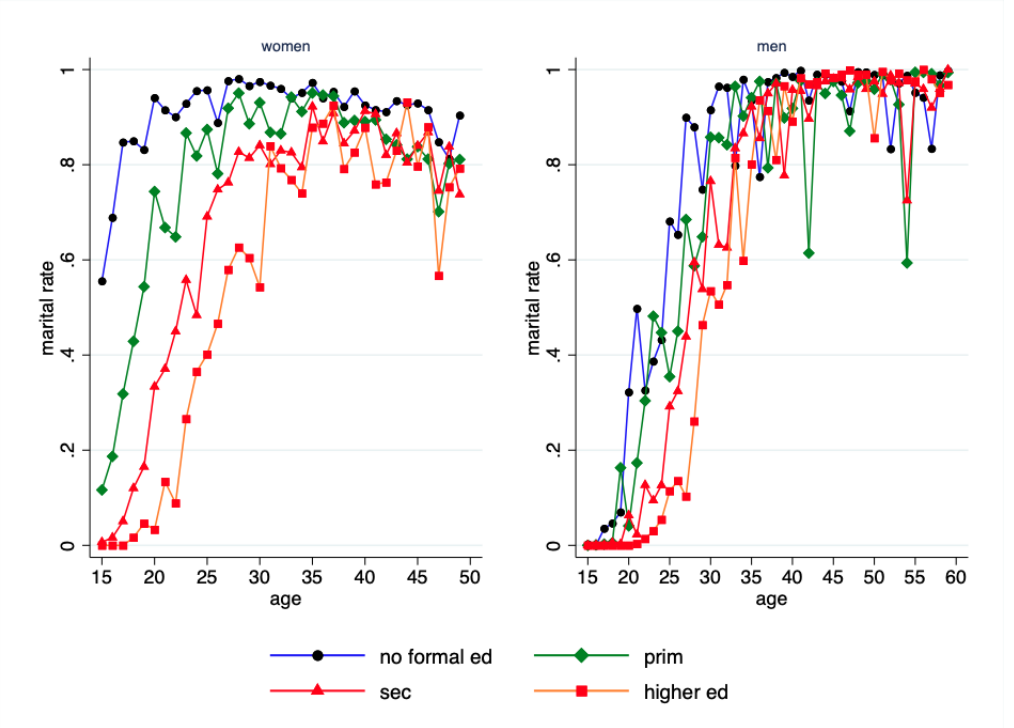
Table 2: Descriptive statistics

| VARIABLES | (1) N | (2) mean | (3) median | (4) sd | (5) min | (6) max |
|---|---|---|---|---|---|---|
| *Panel A: women* | | | | | | |
| age | 43,111 | 34.61 | 35 | 7.95 | 17 | 49 |
| rural | 43,111 | 0.62 | 1 | 0.48 | 0 | 1 |
| age first union | 36,744 | 18.62 | 17 | 5.31 | 5 | 47 |
| age first child | 34,188 | 20.09 | 19 | 4.81 | 9 | 45 |
| married to a polygamous partner | 19,555 | 0.39 | 0 | 0.49 | 0 | 1 |
| *Panel B: men* | | | | | | |
| age | 10.313 | 42.98 | 43 | 6.61 | 27 | 59 |
| rural | 10.313 | 0.63 | 1 | 0.48 | 0 | 1 |
| age first union | 9.753 | 26.44 | 26 | 6.33 | 10 | 56 |
| age first child | 9.525 | 28.18 | 27 | 8.44 | 8 | 99 |
| polygamous | 9.448 | 0.23 | 0 | 0.42 | 0 | 1 |

**Note**: Education of partners is divided into uneducated (U), has some primary education (P), has completed primary education (CP), has some secondary education (S), has completed secondary education (CS), and has some higher education (HE).

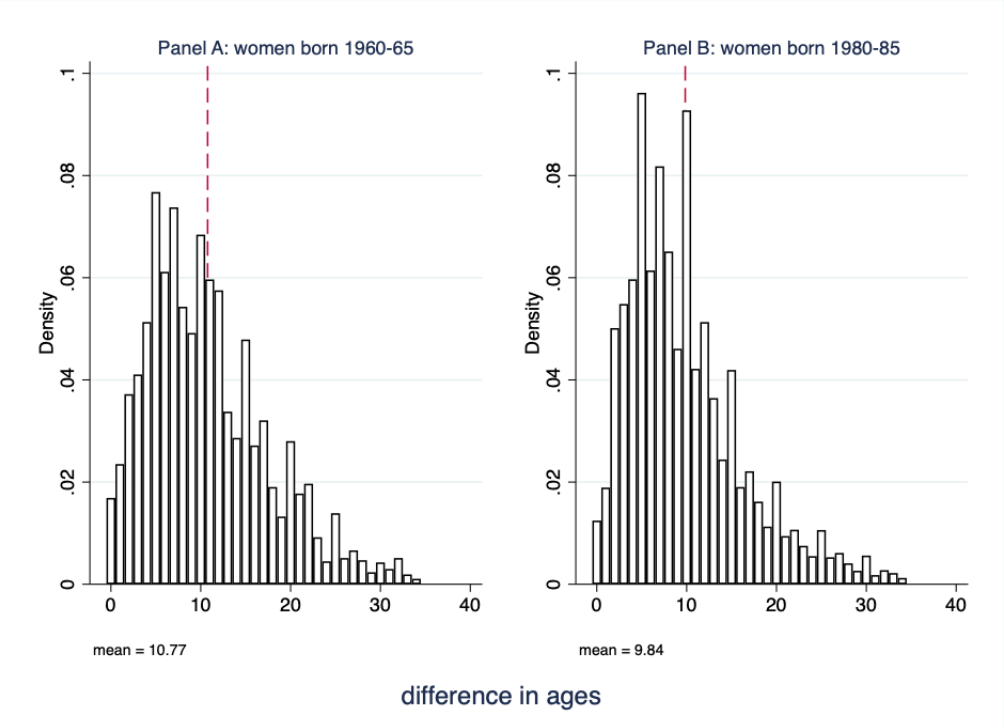
**Source**: DHS Nigeria 2003, 2008, 2013, and 2017. Sample: women and men.

Figure 3: Marital rates by age, education, and gender



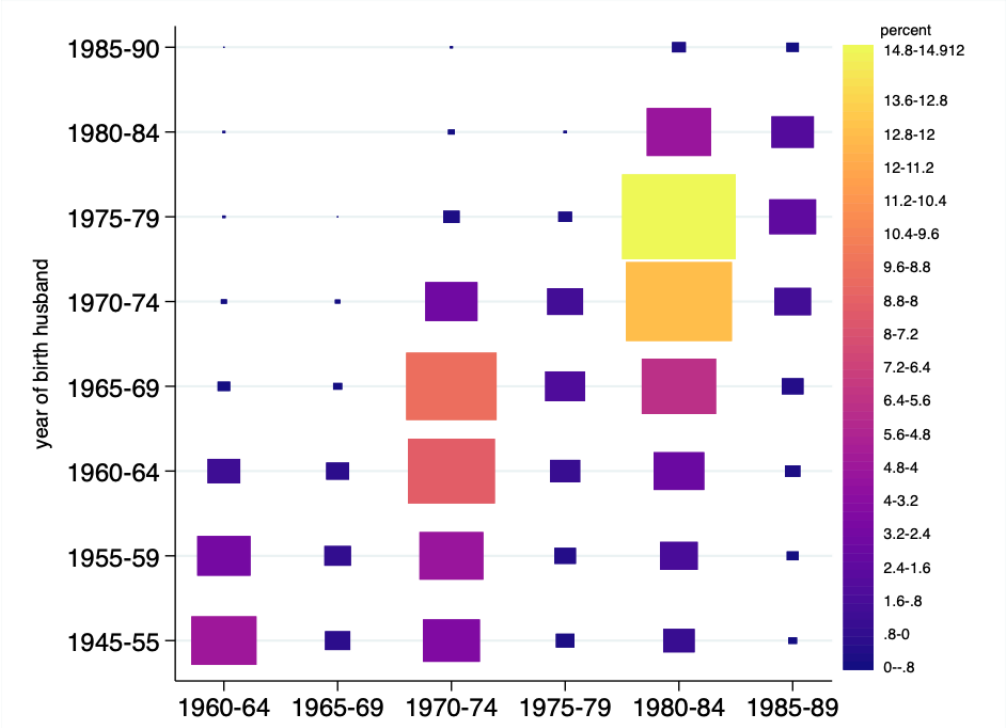

**Source**: DHS Nigeria 2003, 2008, 2013, and 2018.

Figure 4: Difference in ages of partners (husband - wife)



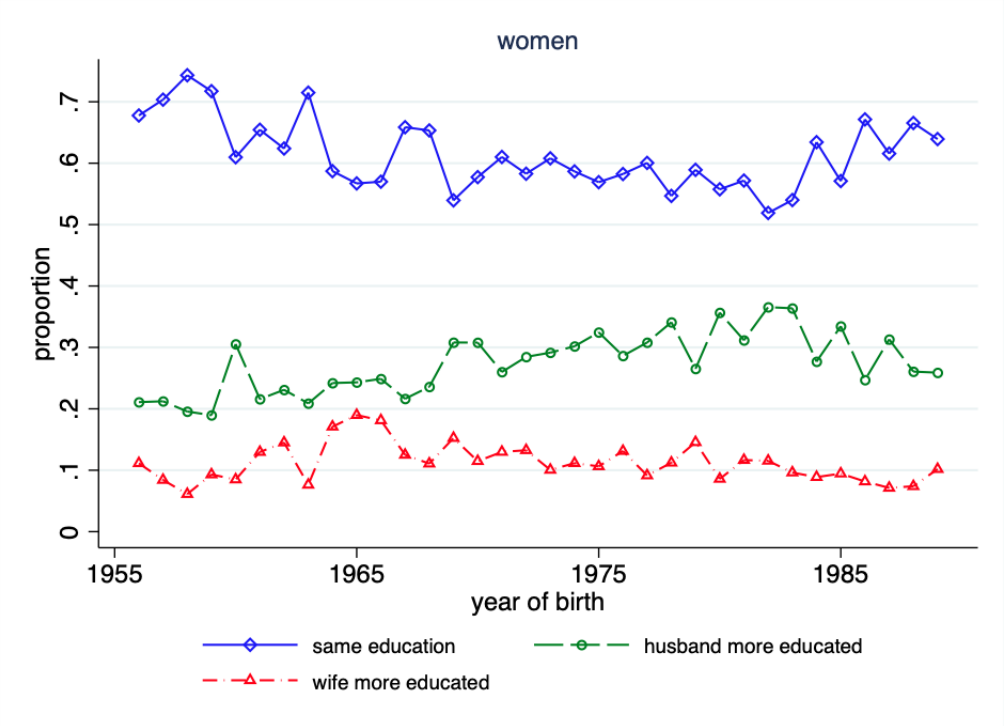

**Source**: DHS Nigeria 2003, 2008, 2013, and 2018.

Figure 5: Distribution of matches by age group of the wife



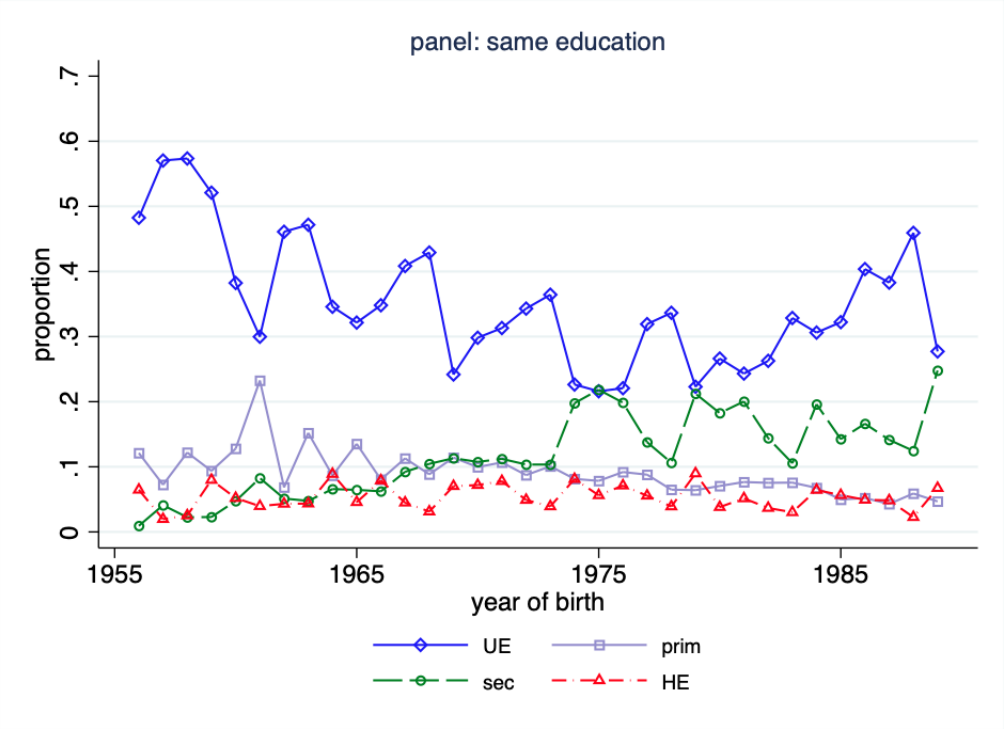

**Source**: DHS Nigeria 2003, 2008, 2013, and 2018.

Figure 6: Comparing education of partners - women



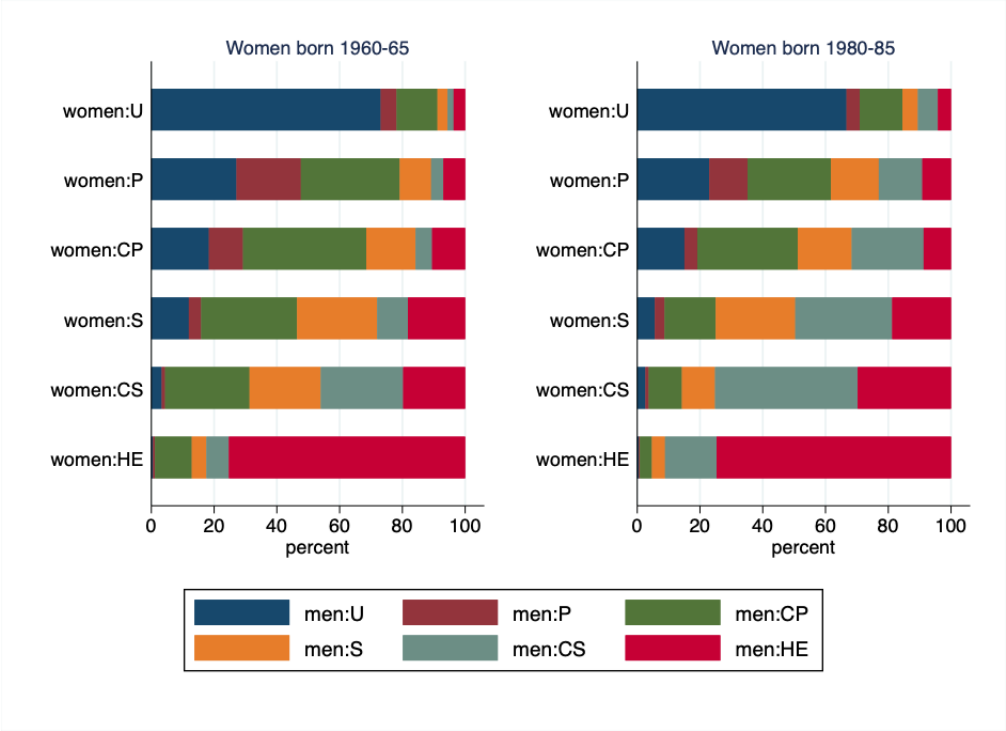

**Source**: DHS Nigeria 2003, 2008, 2013, and 2018

Figure 7: Homogamy in education - women




**Source**: DHS Nigeria 2003, 2008, 2013, and 2018. UE, prim, sec, and HE stands for the four levels of education: uneducated, primary, secondary, and higher education.

Figure 8: Husband's education of married women by cohort




**Source**: DHS Nigeria 2003, 2008, 2013, and 2018. U, P, CP, S, CS, and HE stands for the sixlevels of education: uneducated, primary, completed primary, secondary, completed secondary, and higher education.

# 4 Empirical Strategy

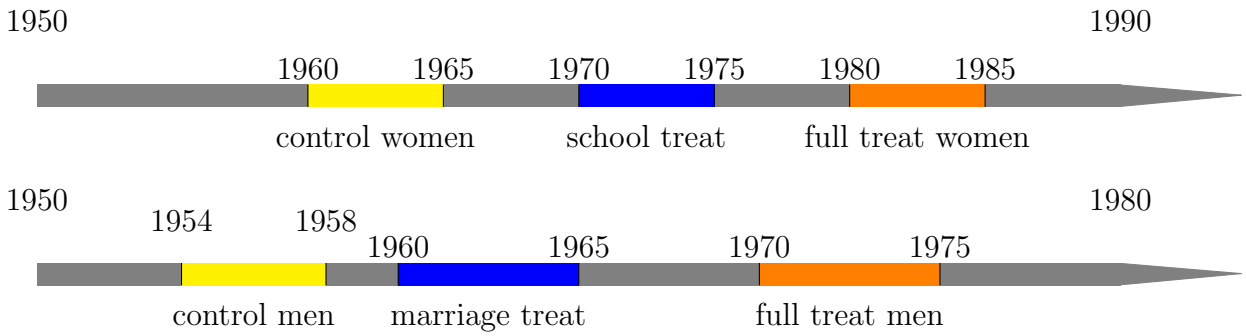
## 4.1 Impact of the UPE on education and on marital outcomes

To identify the effects of education on marital outcomes, we exploit a time variation that determines the exposure to the UPE program based on the cohort of birth of respondents, and a geographical variation determined by the intensity of the policy across LGAs.
The cohort of birth determines whether respondents were exposed to the UPE program. Children started primary school at six years old so children born after 1970 (who were six years old in 1976) are considered to have been exposed to the UPE program.
Emulating Larreguy and Marshall [2017] and Bleakley [2010], we use the variation in the enrollment potential of the UPE across LGAs and by gender to define the intensity of the UPE program: where enrollment was high prior to the reform, the potential impact of the UPE is expected to be smaller. The intensity of the program is defined as the gap between the potential and the actual enrollment in primary school that is proxied by the female or male share of the LGA population born between 1955 and 1965 and who had not completed primary school.[2] The spatial variation in the potential impact of the program shown in Figure 1 allows us to exploit a geographical variation in addition to the time variation based on the cohort of birth.

We unbundle treatment effects by exploiting the fact that the average age difference between partners is ten years as discussed in section 3. It allows us to define groups as follows: (i) nor the husband nor the wife have been exposed to the UPE reform, (ii) the husband is not exposed to the UPE reform but his wife is, and (iii) the husband and the wife are both exposed to the UPE reform. Figure 9 summarizes the definition of the cohorts.

[2]Because of evidence of late entry into primary school, we depart from Larreguy and Marshall [2017] by restricting the definition of the intensity of the UPE to individuals born between 1955 and 1965 rather 1960 to 1969, in order to limit risks of an attenuation bias.

Figure 9: Cohorts definition disentangling UPE effect for women and men




For women, the impact of the UPE may indeed go through her own exposure to the UPE only. We define this situation as the school treatment (or *school treat*). The school treatment concerns women who are born between 1970 and 1975 and who we assume are married to men born between 1960 and 1965. These men were too old to be impacted by the UPE treatment through their own schooling. The impact of the UPE may also go through a woman's own exposure to the UPE and her husband's exposure to the UPE. We call this treatment the full treatment (or *full treat*). It concerns women born between 1980 and 1985 and whose husbands are assumed to be born between 1970 and 1975. As for men, they may be indirectly impacted by the UPE through their wife's exposure to the UPE (defined as the *marriage treat*). It concerns men born between 1960 and 1965 who are too old to have benefited from the schooling program themselves. A man may also have been exposed to the UPE through his wife's exposure to the UPE and through his own exposure to the UPE (defined as the full treatment (or *full treat*). It concerns men who were born between 1970 and 1975 and who are young enough that they were exposed to the UPE themselves and who marry women who were exposed to the UPE as well.

To decompose direct from indirect effects of the UPE on men, we use the following

specification:

$$\begin{aligned} Y_{iclst} = \alpha + \beta_1 UPE_c + \beta_2 Intensity_l + \beta_3 UPE_c Intensity_l \\ +\beta_4 FULL_c Intensity_l + \gamma X_i + \eta_s + \theta_t + \delta_s UPE_c + \epsilon_{iclst} \end{aligned} \tag{1}$$

where $Y_{iclst}$ is outcome $Y$ for man $i$ in cohort $c$, in state $s$, in LGA $l$, interviewed at time $t$, $UPE_c$ is 1 if man $i$ was exposed to the marriage or the full treatment by virtue of his age, $FULL_c$ is 1 if man $i$ was exposed to the full treatment only by virtue of his age. $Intensity_l$ is the baseline level of schooling in the LGA for men. $\eta_s$ is a state fixed effect, $\delta_s * UPE_c$ controls for state x cohort trends, and $X_i$ is vector of individual controls. $\epsilon_{iclst}$ are robust SEs clustered at the LGA level. $\beta_2$ is interpreted as the effect of both the marriage treatment and the full treatment on men's outcomes, and $\beta_3$ provides the additional effect of the full treatment relative to the marriage treatment on men's outcomes.

For women, we use the following specification:

$$\begin{aligned} Y_{iclst} = \alpha + \beta_1 UPE_c + \beta_2 Intensity_l + \beta_3 UPE_c Intensity_l \\ +\beta_4 FULL_c Intensity_l + \gamma X_i + \eta_s + \theta_t + \delta_s UPE_c + \epsilon_{iclst} \end{aligned} \tag{2}$$

where $Y_{iclst}$ is outcome $Y$ for woman $i$ in cohort $c$, in state $s$, in lga $l$, interviewed at time $t$. $UPE_c$ is 1 if woman $i$ was exposed to the school or the full treatment by virtue of her age, and $FULL_c$ is 1 if woman $i$ was exposed to the full treatment only by virtue of her age. $Intensity_l$ is the baseline level of schooling in the LGA for women. $\eta_s$ is a state fixed effect and $\delta_s * UPE_c$ controls for state x cohort trends. $X_i$ is vector of individual controls. $\epsilon_{iclst}$ are robust SEs clustered at the LGA level. $\beta_2$ yields the effect of both the school treatment and the full treatment on women's outcomes and $\beta_3$ gives the additional effect of the full treatment relative to the school treatment on women's outcomes.

The DID strategy relies on the assumption that absent the UPE program, the change in education (and in marital outcomes) would have been the same in the high-intensity LGAs and in the low-intensity LGAs. We provide evidence to support the parallel trend assumption by applying the DID to cohorts who were too old to have been exposed to the UPE treatment; women born between 1960 and 1965 that we compare to women born between 1953 and 1956 and men born between 1956 and 1958 that we compare to men born between 1954 and 1955.[3]

**Limitations of imputing the partner's year of birth** Using the 10-year age gap to define treated cohorts leads to a crude imputation of the year of birth of husbands (wives). For instance, as suggested by figure 5 in section 3 women born between 1980 and 1985 are more often married to men born between 1970 and 1975 and to men born between 1975 and 1979. Since men born between 1975 and 1979, it is not an issue in terms of interpretation for women exposed to the full treatment. Women exposed to the school treatment are assumed to marry men born between 1960 and 1965. Yet they also marry men born between 1965 and 1969 who may be partially treated themselves by the UPE because of late entries in primary school. There are two answers to the concern. First, since we instrument the education (or lack thereof) of the partner with the year of birth interacted with the spatial intensity of the UPE, as long as the year of birth of the wife predicts well enough the education of the husband, the instrument is valid. Second, if husbands that are assumed to be unexposed to the UPE are partially treated because of late entries into school, then it may play down our ability to differentiate the impact of the school treatment compared to the full treatment on women. In a subsequent version of the paper, we will refine the imputation by using a probability to be married to a woman (man) of a given age group rather than a dummy variable.

[3]The data does not contain observations for women born before 1953, and contains very few observations for men born before 1954.

**Migration** The DHS does not provide information on the region in which respondents were educated and respondents are geolocalized in their region of residence at the time of the survey, and not in the region where they lived when they were of schooling age. If people with different attitudes towards women or views about marriage migrate in a systematical way in some LGAs, then selection into migration may bias our estimates. As the previous literature on the impact of the UPE, notably Osili and Long [2008] and Larreguy and Marshall [2017], we will test the robustness of the results to migration.

**Change in gender composition of peers** A confounder of the impact of the UPE may be the change in the gender composition of peers at school. We address this concern in section 5.3.

The first part of the analysis relies on reduced-form estimations of the impact of the UPE program on marital outcomes. Our capacity to isolate the causal impact of education on marital outcomes with a reduced form analysis is limited as we are likely to confound the impact of the education of the wife or the husband and the impact of assortative matching on marital outcomes. The estimates yielded by the reduced forms can be considered as an upper-bound of the effect of education on marital outcomes. In a subsequent version of this work, we go further than the reduced-form approach and use a structural model of the marriage market to tease out the impact of education from the impact of assortative matching on marital outcomes.

# 5 Results

## 5.1 First stage - Impact of the UPE on education

Results in table 3 shows that the UPE had strong effects on primary school attendance both for women in the school treat arm (born between 1970 and 1975) and in the full treat arm (born between 1980 and 1985). Column 1 of table 3 suggests that a one SD increase in the intensity of the UPE led to 0.21SD increase (+10pp) in the probability to attend primary school for women exposed to the UPE and to 0.33SD increase in the probability to complete primary school. The effect of the UPE carried over secondary school although to a different extent for women in the school treat arm compared to women in the full treat arm. Column 3 of table 3 suggests that a one SD increase in the intensity of the UPE increased the probability to attend secondary school by 0.18SD. The additional effect of the UPE for women in the full treatment arm however is negative suggesting that the increase in secondary schooling was lower for them than for women in the school treatment arm. The pattern is more acute for the probability to complete primary school as shown in column 4 of table 3: it suggests that if the UPE increased by 0.17 SD the probability to complete secondary school for all women exposed to the program, the gain in completing secondary school attendance was halved for the cohort of women born between 1980 and 1985. It could be explained by the fact that the free tuition ended in 1981, and that even though women did not stop going to primary school as a response to the end of the program, female enrollment stopped increasing compared to the cohort 1970-1975, and secondary school enrollment may have further slowed down among the younger cohort of female. Another explanation could be that, unlike other outcomes, there exists a trade-off between getting married and finishing secondary school. In the cohort where women are exposed to more educated potential husbands, the gains to marrying earlier may be higher because of the availability of more educated men in their age group. Finally, column 5 of table 3 suggests that years of education of women

increased by 1.33 years (0.26SD), which is consistent with what is found by Osili and Long [2008].

Table 3: Impact of UPE on women's education by treatment arm

| | primary | completed prim | secondary | completed sec | years of education |
|---|---|---|---|---|---|
| Intensity | -0.534*** | -0.755*** | -0.495*** | -0.348*** | -7.317*** |
| | (0.05) | (0.04) | (0.05) | (0.06) | (0.50) |
| Intensity x women exposed to UPE | 0.302*** | 0.479*** | 0.219*** | 0.178*** | 3.929*** |
| | (0.05) | (0.05) | (0.06) | (0.07) | (0.56) |
| Intensity x full treat | 0.013 | -0.001 | -0.043* | -0.086*** | -0.004 |
| | (0.02) | (0.03) | (0.02) | (0.03) | (0.27) |
| Outcome mean control | 0.43 | 0.36 | 0.21 | 0.14 | 3.72 |
| Outcome SD | 0.49 | 0.48 | 0.41 | 0.35 | 5.10 |
| Instrument mean | 0.66 | 0.66 | 0.66 | 0.66 | 0.66 |
| Instrument SD | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 |
| Observations | 35409 | 35409 | 35409 | 35409 | 35391 |
| $R^2$ | 0.52 | 0.49 | 0.39 | 0.28 | 0.53 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

**Source**: DHS Nigeria 2003, 2008, 2013, and 2018. Sample: women aged 18 to 49 years old and married at the time of the survey. Completed prim stands for completed primary school and complete sec for completed secondary school. Primary, completed prim, secondary, and completed sec are dummy variables equal to 1 if the respondent reached that level of education. Years of education is a self-reported continuous variable. Controls include survey year, year of birth, state fixed-effects, state x cohort dummies, religion, ethno-linguistic group, and rural residence. Standard errors are clustered at the LGA level.

The results in table 4 show that the UPE increased the probability to attend and complete both primary and secondary school among men exposed to the full treatment, which are the only ones who were themselves exposed to the UPE program. The effects are sizable; column 1 of table 4 suggests that a one SD increase in the intensity of the UPE raised the probability to attend primary school by 0.42SD. Column 5 of table A.2 shows that a one standard deviation increase in the intensity of the policy increased years of education by 2.1 years or a 0.36 SD increase compared to men in the marriage treatment arm. Figure 10 also provide visual evidence of the impact of the UPE on women and men. The change in trend in primary education and years of education changes for women and men aged 9 years old at the time the UPE started. It reflects late entry into primary school, which is a phenomenon well documented by the literature on the UPE (Osili and Long [2008]). We define our cohort in a way that excludes the partially treated respondents from the analysis. Panel B of table A.1 and table A.2 in the Appendix show

that there is no evidence of a pre-trend in the change in education of women and men prior to the implementation of the UPE.

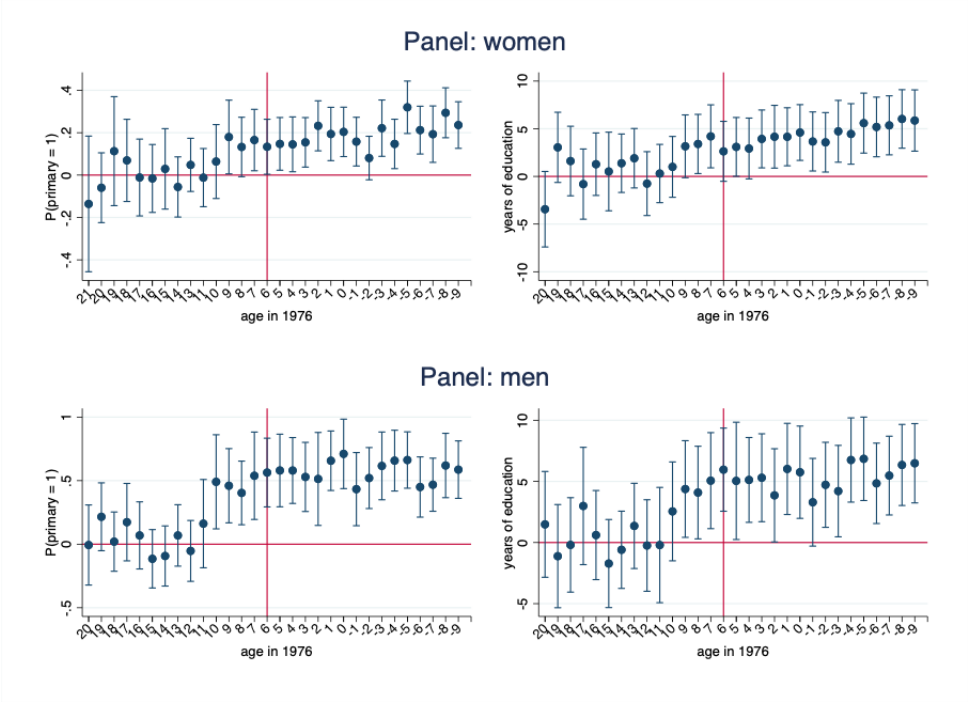
Table 4: Impact of UPE on men's education by treatment arm

| | primary | completed prim | secondary | completed sec | years of education |
|---|---|---|---|---|---|
| Intensity | -0.653*** | -0.935*** | -0.613*** | -0.453*** | -9.016*** |
| | (0.07) | (0.06) | (0.07) | (0.07) | (0.63) |
| Intensity x men exposed to UPE | -0.060 | 0.089 | 0.020 | 0.067 | -0.044 |
| | (0.08) | (0.07) | (0.08) | (0.09) | (0.87) |
| Intensity x full treat | 0.566*** | 0.576*** | 0.280*** | 0.135** | 5.679*** |
| | (0.06) | (0.05) | (0.06) | (0.07) | (0.65) |
| Outcome mean control | 0.58 | 0.49 | 0.29 | 0.23 | 5.37 |
| Outcome SD | 0.49 | 0.50 | 0.46 | 0.42 | 5.84 |
| Instrument mean | 0.38 | 0.38 | 0.38 | 0.38 | 0.38 |
| Instrument SD | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 |
| Observations | 9418 | 9418 | 9418 | 9418 | 9414 |
| $R^2$ | 0.50 | 0.50 | 0.35 | 0.27 | 0.48 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

**Source**: DHS Nigeria 2003, 2008, 2013, and 2018. Sample: men aged 26 to 59 years old and married at the time of the survey. Completed prim stands for completed primary school and complete sec for completed secondary school. Primary, completed prim, secondary, and completed sec are dummy variables equal to 1 if the respondent reached that level of education. Years of education is a self-reported continuous variable. Controls include survey year, year of birth, state fixed-effects, state x cohort dummies, religion, ethno-linguistic group, and rural residence. Standard errors are clustered at the LGA level.

Figure 10: Regression coefficients - impact of UPE on education by gender




**Source**: DHS Nigeria 2003, 2008, 2013, and 2018. Panel: women: women aged 18 to 49 years old and married at the time of the survey. Left-hand side of the graph shows the coefficients of a regression of the probability to attend primary school on the age in 1976. Right-hand side fo the graph shows the coefficients of a regression of the years of education on the age in 1976. Years of education are self-reported. Controls include survey year, year of birth, state fixed-effects, state x cohort dummies, religion, ethno-linguistic group, and rural residence. Standard errors are clustered at the LGA level.

## 5.2 Impact of the UPE on marital outcomes

**Testing implicit assumptions for women's treatment arms** To isolate the impact of the schooling treatment on women's marital outcomes, we compare women who were not impacted by the program to women who were exposed to the UPE only through their own education. So we need the husbands of women born in 1970-75 to be equally educated as the husbands of women born between 1960 and 1965. Table A.16 in the Appendix shows that even though the husbands of women born between 1970 and 1975 are more educated than the husbands of women born between 1960 and 1965, the increase in their education is small; a one standard deviation increase in the intensity of the treatment increased their probability to complete primary school by 6pp (0.10 SD) and their years of education by 0.03 year (0.07 SD).[4]

To isolate the impact of the additional effect of the husband's education on women's marital outcomes, we assume that the potential husbands of women born between 1980 and 1985 are more educated than the potential husbands of women born between 1970 and 1975. Table A.17 in the Appendix shows that it is the case; husbands of married women born between 1980 and 1985 are more likely to be educated than the husbands of women born between 1970 and 1975.

**Testing implicit assumptions for men's treatment arms** To isolate the effect of women's education on men's marital outcomes, we assume that the only difference between the men of the control group and the men of the marriage treatment arm comes from their wives's education and not from a change in men's own education. Table A.19 in the Appendix shows that the condition is satisfied; there is no increase in education

[4]We assume that husbands of women born between 1970 and 1975 are born between 1960 and 1965 and hence are not supposed to be treated by the UPE. In our sample, the 25th percentile of the year of births of the partners of women born between 1970 and 1975 is 1958 and the 75th percentile is 1968. Some husbands of the women born 1970 and 1975 are likely to have been exposed to the UPE directly.

between men born between 1960 and 1965 compared to men born between 1954 and 1958. To tease out the effect of the full treatment from the marriage treatment arms of men on marital outcomes, we need men in the full treatment group to be actually more educated than those in the marriage treatment arm, which is what table A.19 in the Appendix shows.

### 5.2.1 Decomposing the impact of the UPE on men

We do not find that the UPE had a significant impact on men's age at first union, age at first child, on the age difference with their partner, nor on the probability to be polygamous (table A.21 in the Appendix). The tolerance of IPV of men does not seem affected either except for condoning IPV when the wife goes out without telling the husband, that increases for both the marriage treat and the full treat arms (table A.22), though at the 90% level.

The UPE seems to have had no impact on decision-making when pooling both cohorts of men except for deciding alone what to do with the wife's earnings: as shown in column (4) of table 5 a one SD increase in the UPE intensity is associated with a 0.19SD increase in the probability that the husband declares to be the sole decisioner about what to do with the wife's earnings. The additional effect of being exposed to the schooling reform themselves cancels out the increase in the probability to decide alone on how to spend women's earnings. If the average effect over both cohorts on decision-making over large household purchases, visits to family, and the number of children cannot be distinguished from zero, the additional effect of belonging to the full treat cohort is negative and significant; men who are themselves educated in addition to being exposed to more educated women are less likely to declare that they are the sole decisioner in their household even though the effects are modest but not negligible (-0.13SD for deciding alone about household purchases, -0.18SD for deciding alone about vsisits to family, and -16SD

for the deciding on the number of children).

Table 5: Decision making - men

| | large hh purchases | purchases daily needs | visits to family | money wife earns | nb of children |
|---|---|---|---|---|---|
| *Panel A: Interest Experiment* | | | | | |
| Men decides alone on: | | | | | |
| Intensity | 0.039 | 0.120* | 0.165 | 0.032 | 0.222** |
| | (0.07) | (0.06) | (0.10) | (0.09) | (0.10) |
| Intensity x men exposed to UPE | 0.037 | -0.035 | 0.116 | 0.279*** | -0.017 |
| | (0.09) | (0.10) | (0.13) | (0.11) | (0.12) |
| Intensity x full treat | -0.143** | -0.081 | -0.243*** | -0.168** | -0.216** |
| | (0.06) | (0.08) | (0.08) | (0.09) | (0.10) |
| Outcome mean control | 0.81 | 0.57 | 0.55 | 0.32 | 0.50 |
| Outcome SD | 0.39 | 0.49 | 0.50 | 0.47 | 0.50 |
| Instrument mean | 0.38 | 0.40 | 0.40 | 0.40 | 0.38 |
| Instrument SD | 0.37 | 0.38 | 0.38 | 0.37 | 0.37 |
| Observations | 9394 | 4617 | 4600 | 4538 | 4228 |
| $R^2$ | 0.32 | 0.51 | 0.33 | 0.36 | 0.31 |
| pval test: total effect full T = 0 | 0.19 | 0.21 | 0.29 | 0.27 | 0.08 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

**Source**: DHS Nigeria. Sample: Men.

### 5.2.2 Decomposing the impact of the UPE on women

Even though the underlying conditions are not perfectly fulfilled to isolate the impact on women's outcomes, results in section 5.2.1 suggest that the UPE had a limited impact on men's marital outcomes. As a result, any effect of the treatment captured for women who were exposed to the UPE through their own education only is plausibly driven by a change in their own outcomes and not by a change in their husband's.

Results in table 6 suggest that the UPE delayed entry into marriage but that there is no significant additional impact of being married to a husband who was himself exposed to the UPE. A one SD increase in the intensity of the UPE delayed age at marriage by 0.59 year or 0.10SD, which is a small effect. This result suggests that a key driver to delay entry into marital life is women's education rather than the husband's education. We find no significant impact on the age difference between partners. The probability to be married before 15 is negatively associated with the additional effect of being exposed to more educated husbands, which is consistent with the fact that husband's education

plays a key role in decreasing child marriage. As for polygamy, it decreases in response to the UPE, but the additional effect of having a husband exposed to the UPE seem to offset (half of the pooled effect) the overall decrease.

Table 6: Women's marriage outcomes

| | age at first union | age diff. with partner | married before 15 | age at first child | polygamous partner | junior wife |
|---|---|---|---|---|---|---|
| Intensity | -2.945*** | 1.314 | 0.159*** | -2.410*** | 0.217*** | 0.011 |
| | (0.71) | (0.90) | (0.05) | (0.59) | (0.07) | (0.09) |
| Intensity x women exposed to UPE | 1.679** | -1.288 | -0.061 | 1.573** | -0.152** | -0.086 |
| | (0.79) | (1.15) | (0.06) | (0.65) | (0.07) | (0.12) |
| Intensity x full treat | 0.083 | 0.635 | -0.097*** | -0.473 | 0.075** | 0.084 |
| | (0.36) | (0.55) | (0.03) | (0.32) | (0.03) | (0.07) |
| Outcome mean control | 17.94 | 10.77 | 0.31 | 19.81 | 0.43 | 0.46 |
| Outcome SD | 5.41 | 6.80 | 0.46 | 5.03 | 0.49 | 0.50 |
| Instrument mean | 0.66 | 0.66 | 0.66 | 0.66 | 0.66 | 0.79 |
| Instrument SD | 0.35 | 0.34 | 0.35 | 0.34 | 0.35 | 0.28 |
| Observations | 32038 | 34184 | 32038 | 30954 | 18371 | 11723 |
| $R^2$ | 0.34 | 0.09 | 0.27 | 0.22 | 0.19 | 0.09 |
| pval test: total effect full T = 0 | 0.02 | 0.52 | 0.01 | 0.08 | 0.31 | 0.99 |

**Note**: DHS Nigeria 2003, 2008, 2013, and 2018. Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria 2003, 2008, 2013, and 2018. Sample: women aged 18 to 49 years old at the time of the survey and married. For polygamous partner and whether the woman is a junior wife, we select women aged 35 and more. Women exposed to UPE is a dummy equal to 1 if women were born between 1970 and 1975 or 1980 and 1985, and 0 if women were born between 1960 and 1965. Full treat is a dummy equal to 1 if women were born in 1980 and 1985. Controls include survey year, year of birth, state fixed-effects, state x cohort dummies, religion, ethno-linguistic group, and rural residence. Standard errors are clustered at the LGA level.

The following results on matching outcomes confound the effect of potential changes in preferences on matching, opportunities of meeting partners from the effect of changes in the stock of available partners with a given level of education. In a subsequent version of this work, we will compare these results with the one yielded by a log-linear model that accounts for the change in the marginal distribution of education among available partners. The log-linear model is usually used in quantitative sociology when studying changes in marriage patterns (Bouchet-Valat and Dutreuilh [2015]) and has direct links to structural models of the marriage market designed to assess changes in assortative matching over time (Chiappori et al. [2020]).

The UPE seems to have modified the characteristics of homogamous unions as shown in table 7. Column 1 suggests that both the school treatment and the full treatment did not have an impact on the probability to be in a homogamous union. It also suggests that being a woman exposed to the full treatment decreases the probability to be in ho-

mogamous union compared to women exposed to the UPE through their own schooling only. Column 2 of table 7 suggest that the UPE has contributed to decrease homogamy among the least educated for women of both cohorts by 0.08SD, and that being married to a more educated husband further decreases this probability compared to women whose husband is less likely to be educated. As shown in column 3, the pooled effect of the school treatment and the full treatment is null but the full treatment is associated with an increase in the probability of homogamy among partners who attended primary school. For women of both cohorts, the UPE is positively associated with unions in which both partners have attended secondary school but the additional impact of being married to a more educated husband offsets this increase. Finally, column 5 shows that exposure to the UPE is positively linked to an increase in unions among partners who both have higher education. So the UPE is associated with less homogamy among the least educated, and more homogamy at the highest level of education.

As shown in column 1 of table 8, the UPE is associated with a decrease in female hypergamy but the decrease is partially offset by the additional effect of being exposed to more educated partners in addition to women having more schooling themselves. We find the same pattern when we zoom in on cases where the husband has attended primary school and the wife has no formal education. We find no impact of the UPE on unions where the husband has attended secondary school and the wife has no formal education. As suggested by columb 4 of table 8, the UPE is positively associated with the probability of unions between a husband who attended secondary school and a wife who has attended primary school for both cohorts. The additional change brought about by being exposed to more educated husbands is positive and significant, but very small (0.05SD).

Column 1 of table 9 suggests that the UPE is positively linked to a large increase in unions where the wife is more educated than the husband (+0.19SD), and that the effect may be driven by unions between women who attended secondary school and men who

attended primary school only.

Table 7: Women's marriage outcomes - Homogamy

| | equal educ | equal no educ | equally prim | equally secondary | equally higher |
|---|---|---|---|---|---|
| Intensity | 0.030 | 0.308*** | 0.048 | -0.111*** | -0.215*** |
| | (0.07) | (0.05) | (0.04) | (0.03) | (0.04) |
| Intensity x women exposed to UPE | 0.008 | -0.119** | -0.038 | 0.077* | 0.088** |
| | (0.08) | (0.05) | (0.04) | (0.05) | (0.04) |
| Intensity x full treat | -0.118*** | -0.088** | 0.045** | -0.125*** | 0.050* |
| | (0.04) | (0.03) | (0.02) | (0.03) | (0.03) |
| Outcome mean control | 0.67 | 0.45 | 0.11 | 0.06 | 0.05 |
| Outcome SD | 0.47 | 0.50 | 0.31 | 0.24 | 0.22 |
| Instrument mean | 0.66 | 0.66 | 0.66 | 0.66 | 0.66 |
| Instrument SD | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 |
| Observations | 35288 | 35288 | 35288 | 35288 | 35288 |
| $R^2$ | 0.08 | 0.42 | 0.12 | 0.19 | 0.12 |
| pval test: total effect full T = 0 | 0.18 | 0.00 | 0.86 | 0.36 | 0.00 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

**Source**: DHS Nigeria 2003, 2008, 2013, and 2018. Sample: women aged 18 to 49 years old at the time of the survey and married. Women exposed to UPE is a dummy equal to 1 if women were born between 1970 and 1975 or 1980 and 1985, and 0 if women were born between 1960 and 1965. Full treat is a dummy equal to 1 if women were born in 1980 and 1985. Dependent variables: equal educ is a dummy equal to 1 if both partners have the same level of education, equal no educ is a dummy equal to 1 if both partners have no formal education, equally prim equal is a dummy equal to 1 if both partners have some primary education, equally sec is a dummy equal to if both partners have some secondary education, and equally higher is a dummy equal to 1 if both partners have some higher education. Controls include survey year, year of birth, state fixed-effects, state x cohort dummies, religion, ethno-linguistic group, and rural residence. Standard errors are clustered at the LGA level.

Table 8: Women's marriage outcomes - Female hypergamy

| | female hypergamy | husbandprim-wife noeduc | husband sec-wife noeduc | husband sec-wife prim |
|---|---|---|---|---|
| Intensity | 0.155*** | 0.189*** | 0.035 | -0.065 |
| | (0.05) | (0.03) | (0.02) | (0.04) |
| Intensity x women exposed to UPE | -0.185*** | -0.159*** | -0.027 | 0.080* |
| | (0.06) | (0.04) | (0.02) | (0.05) |
| Intensity x full treat | 0.125*** | 0.049** | 0.027 | 0.036* |
| | (0.04) | (0.02) | (0.02) | (0.02) |
| Outcome mean control | 0.22 | 0.08 | 0.04 | 0.06 |
| Outcome SD | 0.41 | 0.27 | 0.20 | 0.24 |
| Instrument mean | 0.66 | 0.66 | 0.66 | 0.66 |
| Instrument SD | 0.34 | 0.34 | 0.34 | 0.34 |
| Observations | 35288 | 35288 | 35288 | 35288 |
| $R^2$ | 0.08 | 0.07 | 0.06 | 0.07 |
| pval test: total effect full T = 0 | 0.32 | 0.00 | 1.00 | 0.01 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria 2003, 2008, 2013, and 2018. Sample: women aged 18 to 49 years old at the time of the survey and married. Women exposed to UPE is a dummy equal to 1 if women were born between 1970 and 1975 or 1980 and 1985, and 0 if women were born between 1960 and 1965. Full treat is a dummy equal to 1 if women were born in 1980 and 1985. Dependent variables: female hypergamy means that the wife is less educated than the husband, and is a dummy variable, husband prim-wife no educ is a dummy equal to 1 if the husband has some primary education and the wife has none, husband sec-wife no educ is a dummy equal to 1 if the husband has some primary education and the wife has no formal education, husband sec-wife prim is a dummy equal to 1 if the husband attended secondary school and the wife attended primary school. Controls include survey year, year of birth, state fixed-effects, state x cohort dummies, religion, ethno-linguistic group, and rural residence. Standard errors are clustered at the LGA level.

Table 9: Women's marriage outcomes - Female hypogamy

| | female hypogamy | wife prim-husband noeduc | wife sec-husband prim | wife sec-husband noeduc |
|---|---|---|---|---|
| Intensity | -0.185*** | -0.018 | -0.136*** | -0.019 |
| | (0.06) | (0.03) | (0.04) | (0.01) |
| Intensity x women exposed to UPE | 0.177*** | 0.041 | 0.110** | 0.006 |
| | (0.06) | (0.03) | (0.05) | (0.02) |
| Intensity x full treat | -0.008 | -0.027** | 0.033* | 0.007 |
| | (0.02) | (0.01) | (0.02) | (0.01) |
| Outcome mean control | 0.11 | 0.04 | 0.05 | 0.01 |
| Outcome SD | 0.31 | 0.20 | 0.21 | 0.11 |
| Instrument mean | 0.66 | 0.66 | 0.66 | 0.66 |
| Instrument SD | 0.34 | 0.34 | 0.34 | 0.34 |
| Observations | 35288 | 35288 | 35288 | 35288 |
| $R^2$ | 0.08 | 0.04 | 0.11 | 0.04 |
| pval test: total effect full T = 0 | 0.01 | 0.68 | 0.00 | 0.41 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria 2003, 2008, 2013, and 2018. Sample: women aged 18 to 49 years old at the time of the survey and married. Women exposed to UPE is a dummy equal to 1 if women were born between 1970 and 1975 or 1980 and 1985, and 0 if women were born between 1960 and 1965. Full treat is a dummy equal to 1 if women were born in 1980 and 1985. Dependent variables: female hypogamy means that the wife is more educated than the husband, and is a dummy variable, wife prim-husband no educ is a dummy equal to 1 if the wife attended primary school and the husband has no formal education, wife sec-husband prim is a dummy equal to 1 if the wife attended secondary school and the husband attended primary school, wife sec-husband no educ is a dummy equal to 1 if the wife attended secondary school and the husband has no formal education. Controls include survey year, year of birth, state fixed-effects, state x cohort dummies, religion, ethno-linguistic group, and rural residence. Standard errors are clustered at the LGA level.

**Tolerance of IPV** As for tolerance of IPV, the results in table 10 suggest that increasing women's schooling alone has no significant impact of their tolerance of IPV (except for condoning domestic violence for the neglecting the children). We only capture a small impact of the UPE program when women are married to men who have been treated themselves by the program: for instance, a one SD increase in the intensity of the UPE is associated with a 0.08SD additional decrease in the index of tolerance of IPV among women who were themselves exposed to the UPE and whose husband was treated as well. Even though we find no impact on men's own tolerance of IPV, it seems that being married to husband who was exposed to the UPE improves women's ability to express their disagreement with a harmful gender norm.

Table 10: Tolerance of IPV - women

| | goes out w/o telling | neglects children | argues with him | refuses sex | burns food | index |
|---|---|---|---|---|---|---|
| Intensity | 0.207*** | 0.241*** | 0.233*** | 0.160*** | 0.171*** | 1.058*** |
| | (0.07) | (0.07) | (0.06) | (0.06) | (0.06) | (0.29) |
| Intensity x women exposed to UPE | -0.070 | -0.126* | -0.078 | -0.051 | -0.054 | -0.401 |
| | (0.07) | (0.07) | (0.06) | (0.06) | (0.06) | (0.28) |
| Intensity x full treat | -0.105*** | -0.103*** | -0.101*** | -0.064** | -0.068** | -0.454*** |
| | (0.03) | (0.03) | (0.04) | (0.03) | (0.03) | (0.14) |
| Outcome mean control | 0.35 | 0.33 | 0.29 | 0.27 | 0.18 | 0.21 |
| Outcome SD | 0.48 | 0.47 | 0.45 | 0.44 | 0.38 | 1.97 |
| Instrument mean | 0.66 | 0.66 | 0.66 | 0.66 | 0.66 | 0.66 |
| Instrument SD | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 |
| Observations | 35087 | 35088 | 35010 | 34915 | 35011 | 34557 |
| $R^2$ | 0.27 | 0.21 | 0.20 | 0.24 | 0.21 | 0.29 |
| pval test: total effect full T = 0 | 0.01 | 0.00 | 0.01 | 0.08 | 0.05 | 0.01 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria. Sample: Women.

**Decision-making** The UPE also has effects on women's declaration that they take part in decisions made in their household. Table 11 suggests that overall, women exposed to the UPE are more likely to declare having a say in decisions about their own healthcare and large household purchases. We find no additional effect of the education of the husband.

Table 11: Decision-making - women

| | has a say in own health care | large hh purchases | visits to family |
|---|---|---|---|
| Intensity | -0.219*** | -0.226*** | -0.177** |
| | (0.06) | (0.06) | (0.07) |
| Intensity x women exposed to UPE | 0.176** | 0.221*** | 0.123 |
| | (0.07) | (0.08) | (0.08) |
| Intensity x full treat | 0.005 | -0.042 | 0.003 |
| | (0.05) | (0.04) | (0.04) |
| Outcome mean control | 0.47 | 0.42 | 0.58 |
| Outcome SD | 0.50 | 0.49 | 0.49 |
| Instrument mean | 0.66 | 0.66 | 0.66 |
| Instrument SD | 0.34 | 0.34 | 0.34 |
| Observations | 35349 | 35327 | 35342 |
| $R^2$ | 0.28 | 0.26 | 0.22 |
| pval test: total effect full T = 0 | 0.01 | 0.01 | 0.10 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria. Sample: Women.

**Experience of IPV** Finally, we find that exposure to the UPE program decreased the experience of IPV; the last column of table 12 shows that a one SD increase in the intensity of the UPE is associated with a 0.16SD decrease in the index of overall experience of IPV. The UPE is also negatively associated with the number of controling behaviors a women endures and the probability to experience severe physical violence. We find evidence that the influence of being married to a husband who was exposed to the UPE himself significantly varies according to the type of IPV. The education of the husband is negatively correlated with the probability to be the victim of a controling behavior at the hands of the partner or to experience emotional violence. However, the education of the husband has no addititional (nor mitigating) effect on the intensity of the controling behavior, nor on the probability to experience severe physical IPV.

Table 12: Experience of IPV

| | control | number of control items | emotional IPV | less severe physical IPV | severe physical IPV | marital rape | index |
|---|---|---|---|---|---|---|---|
| Intensity | -0.002 | 0.116 | 0.079** | 0.018 | 0.030* | 0.006 | 0.225** |
| | (0.01) | (0.10) | (0.03) | (0.03) | (0.02) | (0.01) | (0.11) |
| Intensity x women exposed to UPE | 0.009 | -0.173* | -0.036 | -0.020 | -0.045*** | -0.008 | -0.249** |
| | (0.01) | (0.10) | (0.03) | (0.03) | (0.02) | (0.01) | (0.11) |
| Intensity x full treat | 0.044*** | 0.083 | -0.047** | -0.013 | 0.002 | 0.003 | -0.020 |
| | (0.01) | (0.07) | (0.02) | (0.02) | (0.01) | (0.01) | (0.08) |
| Outcome mean control | 0.74 | 1.10 | 0.21 | 0.15 | 0.05 | 0.03 | -0.23 |
| Outcome SD | 0.44 | 1.35 | 0.41 | 0.36 | 0.22 | 0.17 | 1.49 |
| Instrument mean | 0.66 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 |
| Instrument SD | 0.34 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 |
| Observations | 35409 | 20577 | 20535 | 20521 | 20507 | 20510 | 20470 |
| $R^2$ | 0.21 | 0.06 | 0.09 | 0.09 | 0.07 | 0.05 | 0.09 |
| pval test: total full T = 0 | 0.00 | 0.34 | 0.00 | 0.17 | 0.00 | 0.70 | 0.01 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria. Sample: Women.

We acknowledge that when it comes to the impact of the full treatment on men and on women, the estimates may confound the impact of the education of men who were exposed to the UPE, with the fact that they were exposed to more gender diverse cohorts of pupils while attending primary school. Section 5.3 discusses the relevance of the change in the gender composition of school mates of men as a potentiel confounder.

## 5.3 Impact of change in gender composition of school mates on men

We can isolate the impact of the gender composition of the pupils men went to school with on marital outcomes by comparing full treat men and school treat men in low intensity LGAs. As shown in figure 11, in low intensity LGAs the education of men was very close to being universal. As a result, the UPE hardly changed men's level of primary education. Whereas girls where less educated than men prior to the UPE as they had not reached universal primary education - even though, in levels, girls in low intensity LGAs are more likely to be educated than girls in high intensity LGAs. The discrepancy between male universal primary education and female primary education allows to identify the impact of the change in gender composition of the peers of men in primary school on their outcomes later in life. More precisely, three conditions have to be fulfilled:

1. Education of men has to be the same between the full treat and marriage treatment arms (as shown in table A.23)

2. Full treat men are exposed to more girls in schools but the level of education of wives of full treat men (born between 1980 and 1985) does not increase compared to the education of wives of marriage treat men (born between 1970 and 1975) in response to the UPE (as checked in table A.24)

3. The UPE led to closing the gender gap in primary education in low intensity LGAs (as shown in table A.25).

To isolate the impact of the change in gender composition of peers at school for men,

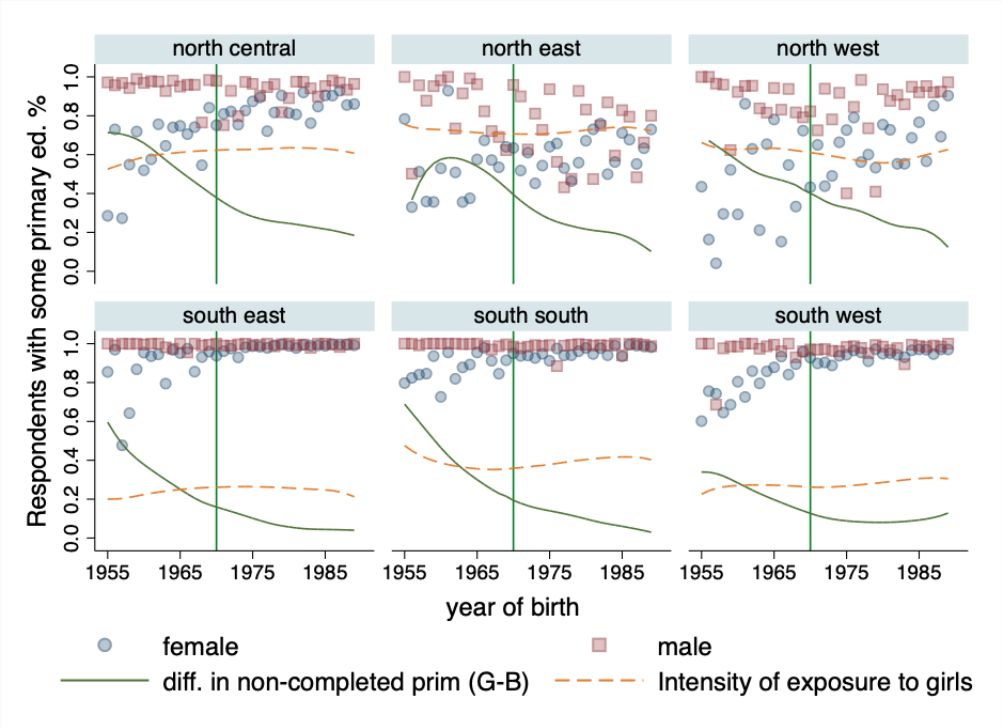
we use a gender composition index (GCI) that we define as follows:

$$\begin{aligned} GCI = &\text{share of LGA female population born between 1960 and 1965} \\ &\text{who had not completed primary school} \\ &- \text{share of LGA male population born between 1960 and 1965} \\ &\text{who had not completed primary school} \end{aligned} \tag{3}$$

As for the definition of the intensity of the UPE variable, we expect that, in the LGAs where the difference between girls' and boys' schooling was higher prior to the reform, the change in the gender composition of peers is expected to be greater, i.e. the intensity of exposure to girls in primary school will be greater.

Results in column 5 of table 13 suggest that a one standard deviation increase in the intensity of exposure to girls in primary school decreases the probability to be polygamous by 0.6pp or 14 standard deviation. As shown in table 14, we do not find that exposure to girls in primary school has consistently changed men's support for tolerance of IPV across the indicators we use. A one standard deviation increase in girls exposure in primary school decreases tolerance of IPV for burning the food by 6pp or 0.25 standard deviation (significant at the 90% level).

Figure 11: Primary education and gender imbalance in schooling by year of birth in low intensity LGAs




**Note**: Sample: High intensity areas are the LGAs where the share of women who had not completed primary school is above the median of the intensity, and low intensity areas are the LGAs the share of women who had not completed primary school is below the median. The green line is the difference between girls and boys who have no primary schooling by year of birth in a LGA.

Table 13: Impact of UPE men marriage vars in low intensity LGA

| | Age first union | Age diff wife1 | Age diff wife2 | Age first child | Polygamous |
|---|---|---|---|---|---|
| Intensity gender composition | -1.296 | -1.760 | 0.903 | 2.844 | 0.230* |
| | (2.37) | (1.84) | (3.32) | (2.20) | (0.13) |
| Intensity GCI x UPE | 0.613 | 1.251 | -2.209 | -3.511 | -0.103 |
| | (2.72) | (1.94) | (3.70) | (2.50) | (0.16) |
| Intensity GCI x full treat | -0.098 | 1.502** | 4.722* | 1.439 | -0.054 |
| | (1.50) | (0.75) | (2.62) | (1.39) | (0.10) |
| Outcome mean control | 26.71 | 10.63 | 15.81 | 28.46 | 0.24 |
| Outcome SD | 6.32 | 6.15 | 7.27 | 6.99 | 0.43 |
| Instrument mean | 0.45 | 0.45 | 0.56 | 0.45 | 0.45 |
| Instrument SD | 0.28 | 0.27 | 0.27 | 0.28 | 0.28 |
| Observations | 3870 | 3527 | 516 | 3734 | 3569 |
| $R^2$ | 0.30 | 0.20 | 0.57 | 0.25 | 0.37 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria. Sample: men.

Table 14: Impact of UPE on men's tolerance IPV in low intensity LGA

| | goes out w/o telling | neglects children | argues with him | refuses sex | burns food | index |
|---|---|---|---|---|---|---|
| Intensity gender composition | -0.221 | -0.223 | 0.035 | -0.110 | -0.221** | -1.085 |
| | (0.18) | (0.20) | (0.15) | (0.11) | (0.09) | (0.86) |
| Intensity GCI x UPE | 0.457** | 0.448** | 0.155 | 0.074 | 0.447*** | 1.952** |
| | (0.22) | (0.22) | (0.18) | (0.12) | (0.14) | (0.95) |
| Intensity GCI x full treat | -0.226** | -0.139 | -0.045 | 0.019 | -0.288* | -0.702 |
| | (0.10) | (0.13) | (0.10) | (0.08) | (0.15) | (0.47) |
| Outcome mean control | 0.18 | 0.17 | 0.17 | 0.11 | 0.07 | -0.01 |
| Outcome SD | 0.38 | 0.38 | 0.38 | 0.31 | 0.25 | 1.80 |
| Instrument mean | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 |
| Instrument SD | 0.28 | 0.28 | 0.28 | 0.28 | 0.27 | 0.27 |
| Observations | 3778 | 3815 | 3800 | 3830 | 3838 | 3662 |
| $R^2$ | 0.30 | 0.30 | 0.29 | 0.33 | 0.27 | 0.35 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria. Sample: men.

As for decision-making, men who were exposed to more girls in primary school tend to be more likely to declare that they are the sole decision-maker for visits to family (+0.16 standard deviation).

Table 15: Impact of UPE men decision making in low intensity LGA

| | large hh purchases | purchases daily needs | visits to family | money wife earns | nb of children |
|---|---|---|---|---|---|
| Intensity gender composition | -0.022 | 0.008 | 0.052 | -0.035 | -0.159 |
| | (0.05) | (0.08) | (0.10) | (0.10) | (0.11) |
| Intensity GCI x UPE | -0.063 | -0.090 | -0.243** | -0.028 | -0.109 |
| | (0.08) | (0.12) | (0.12) | (0.14) | (0.15) |
| Intensity GCI x full treat | 0.182** | 0.258* | 0.374*** | -0.095 | 0.064 |
| | (0.08) | (0.13) | (0.13) | (0.13) | (0.15) |
| Outcome mean control | 0.81 | 0.57 | 0.54 | 0.33 | 0.49 |
| Outcome SD | 0.39 | 0.50 | 0.50 | 0.47 | 0.50 |
| Instrument mean | 0.37 | 0.36 | 0.36 | 0.36 | 0.36 |
| Instrument SD | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 |
| Observations | 6965 | 3491 | 3472 | 3436 | 3192 |
| $R^2$ | 0.34 | 0.52 | 0.33 | 0.39 | 0.36 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria. Sample: men.

[TBC]

# 6 Conclusion

We show that the UPE had an impact on several aspects of marriage in Nigeria; the UPE is linked to a decrease in homogamy in education among the least educated, and to an

increase of it among partners with the highest level of education. The UPE is associated with an overall decrease in unions in which the husband is more educated than the wife but the decrease seems partially offset for women who are exposed to more educated husband in addition to being more educated themselves. The UPE is also positively associated with an increase in unions where the wife is more educated than the husband.

The impact of the UPE on decision-making reported by men in the household is ambiguous: the UPE is positively linked to the the propensity that men decide on their own how to spend their wife's earnings but being more educated themselves offsets this effect. We find that exposure to the UPE through their own schooling in addition to being exposed to more educated wives is negatively associated with men declaring to be the sole decisioner on the number of children to have. Both this results are suggesting a less gender unequal decision-making process in the household in response to the UPE.

As for women, the results show that to entry into marital life, and entry into motherhood are delayed when providing education to women, and being exposed to more educated men yields no additional benefits. The UPE is negatively correlated with women's probability to be in a polygamous union but being exposed to more educated women in addition to being more educated themselves slightly offsets the decrease.

We find that the effect of women's own education may matter more than the huband's education to improve women's say in decision-making in the household when reported by women. However, for tolerance of IPV, it is the opposite; being married to a more educated man seems to be key as exposure to more educated husbands is negatively associated with the tolerance of IPV. The impact of the UPE on experience of IPV seems to vary according to the type of IPV; the intensity of the controlling behavior of the partner and the experience of severe physical violence is negatively correlated with the UPE and being exposed to a more educated husband does not seem to further mitigate exposure to

this type of IPV. However, the probability to experience control and to experience emotional violence are negatively associated with the UPE among women who are exposed to potential husbands who are more educated.

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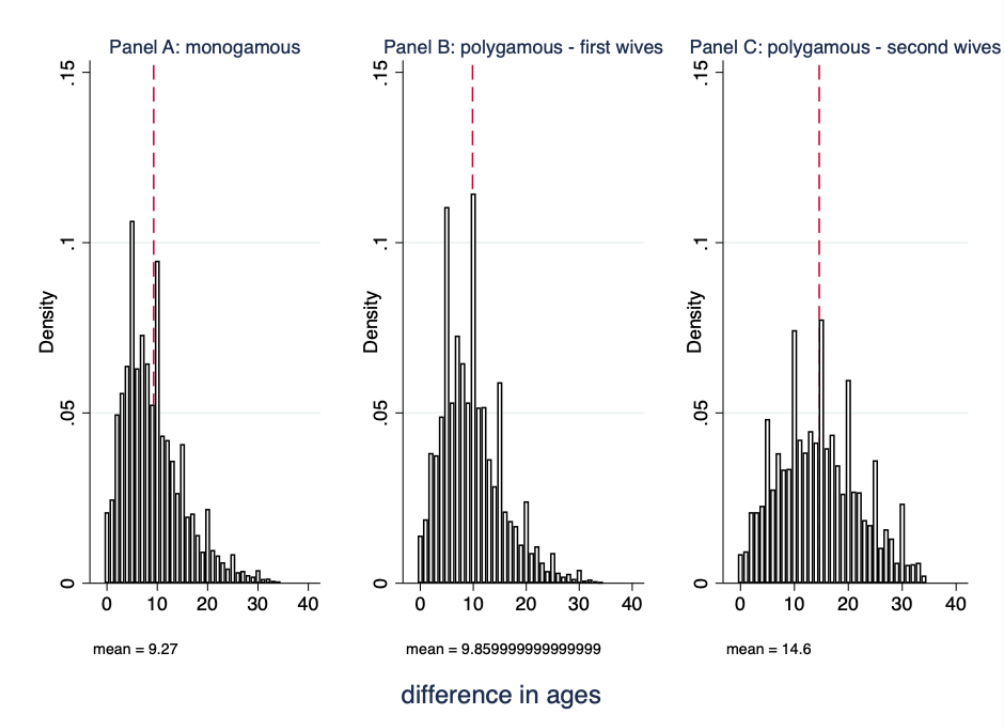
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# Appendix

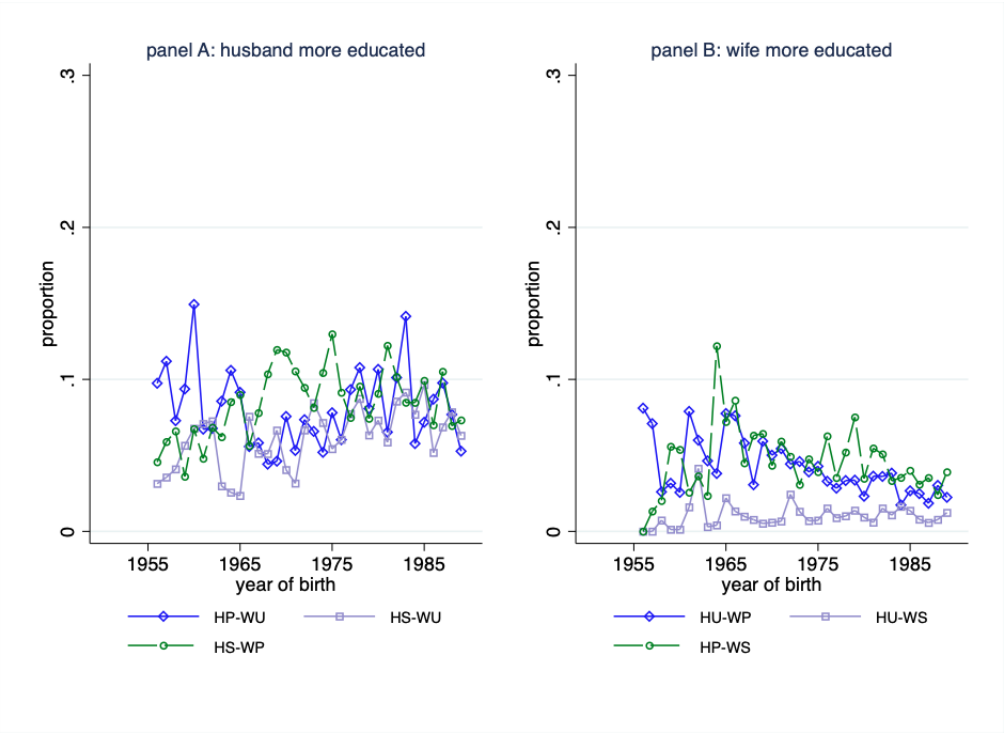
## 6.1 Definition of treated cohorts

Figure A.1: Difference in ages of partners (husband - wife) by type of union




**Source**: DHS Nigeria 2003, 2008, 2013, and 2018.

Figure A.2: Exogamy in education - women




**Source**: DHS Nigeria 2003, 2008, 2013, and 2018.

Table A.1: Effect of UPE intensity on Education, First stage - women

| | Some primary | Completed primary | Some secondary | Completed secondary | Years of education |
|---|---|---|---|---|---|
| *Panel A: Treated individuals* | | | | | |
| Intensity | -0.551*** | -0.743*** | -0.498*** | -0.318*** | -7.378*** |
| | (0.04) | (0.03) | (0.05) | (0.06) | (0.47) |
| Intensity x post-UPE | 0.401*** | 0.525*** | 0.237*** | 0.003 | 4.249*** |
| | (0.05) | (0.04) | (0.06) | (0.06) | (0.50) |
| Outcome mean control | 0.45 | 0.37 | 0.21 | 0.14 | 3.81 |
| Outcome SD | 0.50 | 0.48 | 0.41 | 0.35 | 5.07 |
| Instrument mean | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 |
| Instrument SD | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 |
| Observations | 28026 | 28026 | 28026 | 28026 | 28009 |
| $R^2$ | 0.54 | 0.52 | 0.45 | 0.33 | 0.56 |
| F-stat | 27.96 | 56.55 | 40.22 | 30.62 | 63.45 |
| | Some primary | Completed primary | Some secondary | Completed secondary | Years of education |
| *Panel B: Placebo cohorts* | | | | | |
| Intensity | -0.499*** | -0.806*** | -0.559*** | -0.364*** | -8.647*** |
| | (0.11) | (0.10) | (0.10) | (0.10) | (1.30) |
| Intensity x placebo | -0.112 | -0.016 | -0.035 | -0.037 | 0.262 |
| | (0.11) | (0.10) | (0.09) | (0.10) | (1.27) |
| Mean control | 0.33 | 0.21 | 0.12 | 0.08 | 2.52 |
| Stand. Dev. | 0.47 | 0.41 | 0.33 | 0.28 | 4.66 |
| Observations | 5986 | 5986 | 5986 | 5986 | 5982 |
| $R^2$ | 0.54 | 0.52 | 0.40 | 0.31 | 0.57 |
| F-stat | 20.42 | 69.01 | 24.51 | 6.62 | 27.23 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education different for men and women.

**Source**: DHS Nigeria. Sample: Women.

Table A.2: Effect of UPE intensity on Education, First stage - men

| | Some primary | Completed primary | Some secondary | Completed secondary | Years of education |
|---|---|---|---|---|---|
| *Panel A: Treated individuals* | | | | | |
| Intensity | -0.650*** | -0.923*** | -0.597*** | -0.444*** | -8.829*** |
| | (0.07) | (0.06) | (0.07) | (0.07) | (0.66) |
| Intensity x post-UPE | 0.562*** | 0.793*** | 0.318*** | 0.221** | 6.304*** |
| | (0.08) | (0.08) | (0.09) | (0.10) | (0.87) |
| Outcome mean control | 0.58 | 0.49 | 0.29 | 0.23 | 5.35 |
| Outcome SD | 0.49 | 0.50 | 0.45 | 0.42 | 5.80 |
| Instrument mean | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 |
| Instrument SD | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 |
| Observations | 7069 | 7069 | 7069 | 7069 | 7064 |
| $R^2$ | 0.45 | 0.46 | 0.36 | 0.30 | 0.46 |
| F-stat | 12.22 | 21.92 | 17.67 | 12.56 | 23.08 |
| | Some primary | Completed primary | Some secondary | Completed secondary | Years of education |
| *Panel B: Placebo cohorts* | | | | | |
| Intensity | -0.696*** | -0.756*** | -0.500*** | -0.312*** | -7.594*** |
| | (0.15) | (0.14) | (0.13) | (0.09) | (1.52) |
| Intensity x placebo | 0.116 | -0.132 | -0.105 | -0.151 | -0.984 |
| | (0.17) | (0.16) | (0.17) | (0.13) | (1.84) |
| Outcome mean control | 0.65 | 0.55 | 0.30 | 0.24 | 5.72 |
| Outcome SD | 0.48 | 0.50 | 0.46 | 0.43 | 5.54 |
| Observations | 1118 | 1118 | 1118 | 1118 | 1118 |
| $R^2$ | 0.62 | 0.67 | 0.53 | 0.51 | 0.65 |
| F-stat | 65.38 | 27.36 | 19.62 | 16.77 | 23.87 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education different for men and women.

**Source**: DHS Nigeria. Sample: Men.

Table A.3 suggests there is geographical heterogeneity in the way women were impacted by the UPE. The impact of the reform seems consistent across the north central, north west, south east, south south, and south west regions. In the north east region however, the impact of the UPE on primary school attendance is positive but is not statistically significant, probably because it is less precisely estimated than in other regions. The impact of years of education is not significant, and its magnitude is, at least descriptively, less sizable than the in the other regions. In contrast with what happens in the other regions, the probability to have completed secondary school is negative, significant, and sizable; a one standard deviation increase in the intensity of the UPE decreases the probability to have completed secondary school by 8.75pp, which represents a 0.25 standard deviation decrease compared to the control cohorts. The results suggests that in the north east region, the UPE had an ambivalent effect on girls' schooling; it might have indeed increased their attendance to primary school but it seems to have significantly

decreased their probability to finish secondary school.[5] Table A.9 suggests that there also is some heterogeneity across regions for men but the direction of the effects remains consistent across regions.

Table A.3: Effect of UPE intensity on education by region, First stage - women

| | Some primary | Completed primary | Some secondary | Completed secondary | Years of education |
|---|---|---|---|---|---|
| *Panel A: Treated women* | | | | | |
| Intensity x post UPE x north central | 0.421*** | 0.492*** | 0.076 | -0.043 | 2.920*** |
| | (0.12) | (0.09) | (0.12) | (0.12) | (0.75) |
| Intensity x post UPE x north east | 0.259 | 0.225 | -0.246 | -0.256*** | 0.554 |
| | (0.18) | (0.19) | (0.21) | (0.08) | (1.71) |
| Intensity x post UPE x north west | 0.298*** | 0.232** | -0.076 | 0.017 | 2.196 |
| | (0.10) | (0.10) | (0.15) | (0.17) | (1.39) |
| Intensity x post UPE x south east | 0.375*** | 0.730*** | 0.665*** | 0.281* | 7.635*** |
| | (0.08) | (0.06) | (0.09) | (0.16) | (1.47) |
| Intensity x post UPE x south south | 0.445*** | 0.661*** | 0.481*** | -0.018 | 5.645*** |
| | (0.09) | (0.08) | (0.16) | (0.13) | (0.80) |
| Intensity x post UPE x south west | 0.509*** | 0.634*** | 0.225*** | -0.051 | 4.436*** |
| | (0.07) | (0.06) | (0.09) | (0.11) | (0.80) |
| Outcome mean control | 0.45 | 0.37 | 0.22 | 0.14 | 3.82 |
| Outcome SD | 0.50 | 0.48 | 0.41 | 0.35 | 5.08 |
| Instrument mean | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 |
| Instrument SD | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 |
| Observations | 28026 | 28026 | 28026 | 28026 | 28009 |
| $R^2$ | 0.55 | 0.53 | 0.46 | 0.34 | 0.57 |
| F-stat | 28.54 | 50.19 | 46.06 | 26.85 | 63.42 |
| pval test equality region | 0.55 | 0.00 | 0.00 | 0.06 | 0.01 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

**Source**: DHS Nigeria. Sample: Women.

[5] An alternative explanation to those results could have been that, within a given state, there is little variation between LGAs in the baseline level of schooling of girls in the north east region. It does not seem to be the case though, as the standard deviation of the treatment variable in the north east region is comparable to that of the other regions.

## Table A.4: Men partially exposed to the Education reform

| | Some primary | Completed primary | Some secondary | Completed secondary | Years of education |
|---|---|---|---|---|---|
| *Panel: Partially treated men* | | | | | |
| Intensity x post-UPE | 0.361*** | 0.490*** | 0.268*** | 0.042 | 3.903*** |
| | (0.06) | (0.07) | (0.07) | (0.08) | (0.79) |
| Mean control | 0.69 | 0.63 | 0.43 | 0.35 | 6.98 |
| Stand. Dev. | 0.46 | 0.48 | 0.50 | 0.48 | 5.90 |
| Observations | 7348 | 7348 | 7348 | 7348 | 7345 |
| $R^2$ | 0.54 | 0.53 | 0.40 | 0.30 | 0.50 |
| F-stat | 24.14 | 32.86 | 11.48 | 7.40 | 16.22 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education different for men and women.

**Source**: DHS Nigeria. Sample: Men.

## Table A.5: Women partially exposed to the Education reform

| | Some primary | Completed primary | Some secondary | Completed secondary | Years of education |
|---|---|---|---|---|---|
| *Panel: Partially treated women* | | | | | |
| Intensity x post-UPE | 0.275*** | 0.386*** | 0.083 | 0.078 | 2.898*** |
| | (0.07) | (0.06) | (0.08) | (0.06) | (0.69) |
| Mean control | 0.42 | 0.35 | 0.20 | 0.13 | 3.60 |
| Stand. Dev. | 0.49 | 0.48 | 0.40 | 0.34 | 4.99 |
| Observations | 14536 | 14536 | 14536 | 14536 | 14525 |
| $R^2$ | 0.54 | 0.49 | 0.39 | 0.25 | 0.53 |
| F-stat | 22.02 | 38.30 | 14.47 | 7.69 | 27.57 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education different for men and women.

**Source**: DHS Nigeria. Sample: Women.

## Table A.6: Women fully exposed to UPE vs partially exposed to UPE

| | Some primary | Completed primary | Some secondary | Completed secondary | Years of education |
|---|---|---|---|---|---|
| *Panel: Partially treated women* | | | | | |
| Intensity x post-UPE | 0.088* | 0.121** | 0.070 | 0.008 | 0.850 |
| | (0.05) | (0.05) | (0.06) | (0.06) | (0.54) |
| Mean control | 0.54 | 0.46 | 0.29 | 0.19 | 4.80 |
| Stand. Dev. | 0.50 | 0.50 | 0.45 | 0.39 | 5.35 |
| Observations | 23137 | 23137 | 23137 | 23137 | 23119 |
| $R^2$ | 0.53 | 0.49 | 0.40 | 0.27 | 0.53 |
| F-stat | 9.06 | 16.08 | 13.70 | 11.00 | 18.90 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

**Source**: DHS Nigeria. Sample: Woen.

## Table A.7: Men exposed to the Education reform - extended treatment

| | Some primary | Completed primary | Some secondary | Completed secondary | Years of education |
|---|---|---|---|---|---|
| *Panel: Partially treated men* | | | | | |
| Intensity x post-UPE | 0.642*** | 0.793*** | 0.434*** | 0.217*** | 7.286*** |
| | (0.05) | (0.04) | (0.06) | (0.07) | (0.66) |
| Mean control | 0.70 | 0.64 | 0.44 | 0.36 | 7.15 |
| Stand. Dev. | 0.46 | 0.48 | 0.50 | 0.48 | 5.89 |
| Observations | 22494 | 22494 | 22494 | 22494 | 22485 |
| $R^2$ | 0.43 | 0.41 | 0.32 | 0.26 | 0.41 |
| F-stat | 18.83 | 34.85 | 16.50 | 13.57 | 19.21 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education different for men and women.

**Source**: DHS Nigeria. Sample: Men.

## Table A.8: Women exposed to the Education reform - extended treatment

| | Some primary | Completed primary | Some secondary | Completed secondary | Years of education |
|---|---|---|---|---|---|
| *Panel: Partially treated women* | | | | | |
| Intensity x post-UPE | 0.366*** | 0.497*** | 0.209*** | 0.044 | 3.968*** |
| | (0.04) | (0.04) | (0.06) | (0.06) | (0.46) |
| Mean control | 0.45 | 0.37 | 0.21 | 0.14 | 3.81 |
| Stand. Dev. | 0.50 | 0.48 | 0.41 | 0.35 | 5.07 |
| Observations | 54958 | 54958 | 54958 | 54958 | 54927 |
| $R^2$ | 0.53 | 0.50 | 0.43 | 0.31 | 0.55 |
| F-stat | 29.25 | 45.30 | 40.04 | 25.89 | 54.42 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education different for men and women.

**Source**: DHS Nigeria. Sample: Women.

## Table A.9: Effect of UPE intensity on Education, First stage - men

| | Some primary | Completed primary | Some secondary | Completed secondary | Years of education |
|---|---|---|---|---|---|
| *Panel A: Treated men* | | | | | |
| Intensity x post UPE x north central | 0.664*** | 0.618*** | 0.441** | 0.028 | 5.866*** |
| | (0.15) | (0.15) | (0.21) | (0.17) | (1.78) |
| Intensity x post UPE x north east | 0.461*** | 0.566*** | 0.260* | 0.135 | 4.885*** |
| | (0.14) | (0.13) | (0.14) | (0.17) | (1.58) |
| Intensity x post UPE x north west | 0.876*** | 0.959*** | -0.023 | 0.038 | 5.877*** |
| | (0.18) | (0.19) | (0.19) | (0.13) | (1.74) |
| Intensity x post UPE x south east | 0.428** | 1.099*** | 0.168 | -0.057 | 5.113** |
| | (0.22) | (0.12) | (0.22) | (0.26) | (2.15) |
| Intensity x post UPE x south south | 0.291 | 1.133*** | 0.473* | 0.582** | 7.850*** |
| | (0.18) | (0.16) | (0.28) | (0.27) | (2.19) |
| Intensity x post UPE x south west | 0.839*** | 0.876*** | 0.360 | 0.447** | 8.494*** |
| | (0.11) | (0.11) | (0.22) | (0.22) | (1.89) |
| Outcome mean control | 0.58 | 0.49 | 0.29 | 0.23 | 5.34 |
| Outcome SD | 0.49 | 0.50 | 0.45 | 0.42 | 5.80 |
| Instrument mean | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 |
| Instrument SD | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 |
| Observations | 7069 | 7069 | 7069 | 7069 | 7064 |
| $R^2$ | 0.48 | 0.49 | 0.40 | 0.34 | 0.50 |
| F-stat | 25.62 | 30.85 | 23.53 | 13.49 | 23.84 |
| pval test equality region | 0.06 | 0.01 | 0.56 | 0.29 | 0.69 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

**Source**: DHS Nigeria. Sample: Women.

Table A.10: Men's marriage outcomes

| | age at first union | age diff. wife1 | age diff. wife2 | age at first child | polygamous |
|---|---|---|---|---|---|
| Intensity | -1.835* | 0.720 | -1.030 | -1.450 | 0.104 |
| | (1.08) | (1.11) | (1.54) | (1.09) | (0.09) |
| Intensity x post-UPE | 0.791 | -0.972 | 1.450 | 0.827 | -0.057 |
| | (1.18) | (1.15) | (1.72) | (1.18) | (0.09) |
| Outcome mean control | 25.57 | 11.43 | 17.47 | 27.99 | 0.31 |
| Outcome SD | 6.58 | 6.24 | 7.58 | 8.37 | 0.46 |
| Instrument mean | 0.38 | 0.38 | 0.53 | 0.38 | 0.38 |
| Instrument SD | 0.37 | 0.37 | 0.38 | 0.37 | 0.37 |
| Observations | 6559 | 6033 | 1259 | 6379 | 6360 |
| $R^2$ | 0.39 | 0.30 | 0.39 | 0.26 | 0.30 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria. Sample: men.

Table A.11: Women's marriage outcomes by region

| | Age at first union | Age gap with partner | Married before 15 | Age first child | In a polygamous union |
|---|---|---|---|---|---|
| *Panel A: Treated women* | | | | | |
| Intensity x post UPE x north central | 0.126 | -0.664 | -0.134 | 1.160 | -0.028 |
| | (1.04) | (2.05) | (0.13) | (1.06) | (0.17) |
| Intensity x post UPE x north east | -1.239 | 6.055* | 0.051 | -2.240 | 0.415* |
| | (0.96) | (3.15) | (0.16) | (1.62) | (0.23) |
| Intensity x post UPE x north west | 0.935 | -0.624 | -0.215* | -0.559 | -0.244 |
| | (0.93) | (2.72) | (0.12) | (0.96) | (0.15) |
| Intensity x post UPE x south east | 7.558*** | -7.996*** | -0.182*** | 7.320*** | 0.138 |
| | (1.15) | (2.15) | (0.07) | (1.24) | (0.12) |
| Intensity x post UPE x south south | 2.780*** | -2.715 | -0.283*** | 1.181 | -0.301* |
| | (1.01) | (3.01) | (0.07) | (1.09) | (0.16) |
| Intensity x post UPE x south west | 1.253 | -2.895 | -0.023 | 0.107 | -0.283** |
| | (0.90) | (1.86) | (0.04) | (0.91) | (0.13) |
| Outcome mean control | 18.02 | 10.62 | 0.30 | 19.84 | 0.43 |
| Outcome SD | 5.48 | 7.80 | 0.46 | 5.08 | 0.50 |
| Instrument mean | 0.66 | 0.67 | 0.66 | 0.65 | 0.66 |
| Instrument SD | 0.34 | 0.34 | 0.34 | 0.35 | 0.34 |
| Observations | 22108 | 22644 | 22108 | 19887 | 8666 |
| $R^2$ | 0.35 | 0.10 | 0.31 | 0.22 | 0.24 |
| F-stat | 17.44 | 4.06 | 13.12 | 13.88 | 38.84 |
| pval test equality region | 0.00 | 0.01 | 0.02 | 0.00 | 0.02 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria. Sample: women aged 18+ at the time of the survey.

## Table A.12: Men's marriage outcomes by region

| | Age first union | Age diff wife1 | Age diff wife2 | Age first child | Polygamous |
|---|---|---|---|---|---|
| *Panel A: Treated men* | | | | | |
| Intensity x post UPE x north central | 0.059 | -1.271 | -0.444 | 0.186 | -0.420*** |
| | (1.70) | (1.47) | (3.20) | (1.48) | (0.16) |
| Intensity x post UPE x north east | 5.526*** | 3.783** | 7.856** | 1.973 | 0.337** |
| | (1.79) | (1.92) | (3.49) | (1.76) | (0.13) |
| Intensity x post UPE x north west | -2.024 | -4.669*** | 1.796 | -2.698 | 0.070 |
| | (2.61) | (1.80) | (2.78) | (1.92) | (0.20) |
| Intensity x post UPE x south east | 0.567 | -3.927 | -5.836 | 5.399 | 0.057 |
| | (6.35) | (4.44) | (7.12) | (4.13) | (0.19) |
| Intensity x post UPE x south south | 3.880 | 4.000 | -11.479 | 8.706*** | -0.522** |
| | (2.67) | (7.54) | (9.79) | (3.00) | (0.25) |
| Intensity x post UPE x south west | -5.827** | 0.124 | -4.136 | -6.669*** | -0.192 |
| | (2.39) | (2.49) | (5.55) | (2.23) | (0.19) |
| Outcome mean control | 25.57 | 11.44 | 17.47 | 27.99 | 0.31 |
| Outcome SD | 6.58 | 6.25 | 7.58 | 8.37 | 0.46 |
| Instrument mean | 0.38 | 0.38 | 0.53 | 0.38 | 0.38 |
| Instrument SD | 0.37 | 0.37 | 0.38 | 0.37 | 0.37 |
| Observations | 6559 | 6033 | 1259 | 6379 | 6360 |
| $R^2$ | 0.42 | 0.32 | 0.42 | 0.30 | 0.35 |
| F-stat | 8.02 | 9.07 | . | 7.35 | 7.86 |
| pval test equality region | 0.00 | 0.05 | 0.20 | 0.00 | 0.00 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria. Sample: men aged 18+ at the time of the survey.

## Table A.13: Tolerance of IPV - men

| | common offense | less common offense | goes out w/o telling | neglects children | argues with him | refuses sex | burns food | index |
|---|---|---|---|---|---|---|---|---|
| *Panel A: Interest Experiment* | | | | | | | | |
| Intensity | 0.117 | 0.181* | -0.036 | 0.109 | -0.007 | 0.164* | 0.043 | 0.075 |
| | (0.11) | (0.10) | (0.10) | (0.11) | (0.08) | (0.10) | (0.07) | (0.51) |
| Intensity x post-UPE | -0.050 | -0.073 | 0.105 | 0.061 | 0.040 | -0.064 | 0.057 | 0.499 |
| | (0.11) | (0.10) | (0.11) | (0.13) | (0.09) | (0.10) | (0.08) | (0.54) |
| Outcome mean control | 0.28 | 0.15 | 0.19 | 0.18 | 0.15 | 0.12 | 0.07 | 0.02 |
| Outcome SD | 0.45 | 0.36 | 0.39 | 0.39 | 0.36 | 0.33 | 0.26 | 1.75 |
| Instrument mean | 0.38 | 0.38 | 0.38 | 0.38 | 0.38 | 0.38 | 0.38 | 0.38 |
| Instrument SD | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 |
| Observations | 6420 | 6479 | 6456 | 6505 | 6483 | 6498 | 6529 | 6290 |
| $R^2$ | 0.27 | 0.35 | 0.24 | 0.25 | 0.24 | 0.36 | 0.25 | 0.32 |
| | common offense | less common offense | goes out w/o telling | neglects children | argues with him | refuses sex | burns food | index |
| *Panel B: Placebo cohorts* | | | | | | | | |
| Intensity x placebo | -0.118 | 0.137 | 0.089 | -0.360* | -0.012 | 0.105 | 0.033 | 0.430 |
| | (0.27) | (0.18) | (0.22) | (0.20) | (0.24) | (0.18) | (0.13) | (0.83) |
| Mean control | 0.31 | 0.12 | 0.19 | 0.17 | 0.14 | 0.11 | 0.05 | -0.11 |
| Stand. Dev. | 0.46 | 0.33 | 0.39 | 0.38 | 0.34 | 0.31 | 0.22 | 1.52 |
| Observations | 1055 | 1075 | 1076 | 1083 | 1078 | 1085 | 1085 | 1017 |
| $R^2$ | 0.42 | 0.56 | 0.42 | 0.44 | 0.49 | 0.57 | 0.47 | 0.54 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria. Sample: Men.

Table A.14: Men decides alone - decision-making hh

| | large hh purchases | purchases daily needs | visits to family | money wife earns | nb of children |
|---|---|---|---|---|---|
| *Panel A: Interest Experiment* | | | | | |
| Men decides alone on: | | | | | |
| Intensity | 0.036 | 0.105* | 0.156 | 0.049 | 0.212** |
| | (0.07) | (0.06) | (0.10) | (0.09) | (0.10) |
| Intensity x post-UPE | -0.087 | -0.108 | -0.116 | 0.086 | -0.194 |
| | (0.09) | (0.09) | (0.12) | (0.10) | (0.13) |
| Outcome mean control | 0.81 | 0.57 | 0.55 | 0.32 | 0.50 |
| Outcome SD | 0.39 | 0.49 | 0.50 | 0.47 | 0.50 |
| Instrument mean | 0.37 | 0.39 | 0.39 | 0.39 | 0.37 |
| Instrument SD | 0.37 | 0.38 | 0.38 | 0.38 | 0.37 |
| Observations | 6825 | 3512 | 3498 | 3459 | 3250 |
| $R^2$ | 0.32 | 0.54 | 0.33 | 0.40 | 0.32 |

| | large hh purchases | purchases daily needs | visits to family | money wife earns | nb of children |
|---|---|---|---|---|---|
| *Panel B: Placebo cohorts* | | | | | |
| Intensity x placebo | -0.222 | -0.176 | -0.048 | -0.144 | 0.042 |
| | (0.16) | (0.11) | (0.23) | (0.18) | (0.23) |
| Outcome mean control | 0.81 | 0.48 | 0.51 | 0.27 | 0.51 |
| Outcome SD | 0.39 | 0.50 | 0.50 | 0.44 | 0.50 |
| Observations | 1113 | 1103 | 1095 | 1085 | 989 |
| $R^2$ | 0.54 | 0.67 | 0.51 | 0.61 | 0.55 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria. Sample: men.

Table A.15: Marriage outcomes men exposed to the Education reform - extended treatment

| | age at first union | age diff. wife1 | age diff. wife2 | age at first child | polygamous |
|---|---|---|---|---|---|
| Intensity x post-UPE | 1.187 | 1.044* | -0.853 | 0.842 | 0.044 |
| | (0.94) | (0.58) | (1.26) | (0.85) | (0.06) |
| Mean control | 27.07 | 10.88 | 16.87 | 28.74 | 0.27 |
| Stand. Dev. | 6.91 | 5.86 | 7.17 | 8.84 | 0.44 |
| Observations | 15841 | 16547 | 2751 | 15229 | 17105 |
| $R^2$ | 0.30 | 0.26 | 0.42 | 0.18 | 0.20 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education different for men and women.

**Source**: DHS Nigeria. Sample: Men.

Table A.16: Change in husband's education across women's treatment

| | primary | completed prim | secondary | completed sec | years of education |
|---|---|---|---|---|---|
| *Reference: women born between 1970 and 1975* | | | | | |
| women born 1960-65 × Intensity | -0.082* | -0.164*** | -0.125* | -0.012 | -0.086* |
| | (0.05) | (0.06) | (0.07) | (0.06) | (0.05) |
| women born 1980-1985 × Intensity | 0.115*** | 0.075** | -0.017 | -0.062 | 0.110*** |
| | (0.04) | (0.04) | (0.03) | (0.05) | (0.03) |
| Outcome mean reference group | 0.64 | 0.60 | 0.43 | 0.40 | 0.66 |
| Outcome SD | 0.48 | 0.49 | 0.49 | 0.49 | 0.47 |
| Observations | 37224 | 37224 | 37224 | 38371 | 38195 |
| $R^2$ | 0.40 | 0.38 | 0.29 | 0.23 | 0.40 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria. Sample: women.

Table A.17: Change in husband's education across women's treatment

| | primary | completed prim | secondary | completed sec | years of education |
|---|---|---|---|---|---|
| Intensity | -0.292*** | -0.372*** | -0.348*** | -0.238*** | -0.302*** |
| | (0.05) | (0.05) | (0.07) | (0.06) | (0.05) |
| Intensity x women exposed to UPE | 0.082* | 0.164*** | 0.125* | 0.097 | 0.100** |
| | (0.05) | (0.06) | (0.07) | (0.06) | (0.05) |
| Intensity x full treat | 0.115*** | 0.075** | -0.017 | -0.129*** | 0.146*** |
| | (0.04) | (0.04) | (0.03) | (0.04) | (0.03) |
| Outcome mean control | 0.51 | 0.46 | 0.27 | 0.22 | 0.52 |
| Outcome SD | 0.50 | 0.50 | 0.44 | 0.41 | 0.50 |
| Instrument mean | 0.66 | 0.66 | 0.66 | 0.66 | 0.66 |
| Instrument SD | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 |
| Observations | 37224 | 37224 | 37224 | 42310 | 42134 |
| $R^2$ | 0.40 | 0.38 | 0.29 | 0.31 | 0.43 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria. Sample: women.

Table A.18: Change in husband's education across women's treatment - partial school treat

| | primary | completed prim | secondary | completed sec | years of education |
|---|---|---|---|---|---|
| *Reference: women born between 1966 and 1969* | | | | | |
| women born 1960-65 × Intensity | -0.060 | -0.092 | -0.233*** | -0.052 | -0.066 |
| | (0.06) | (0.07) | (0.08) | (0.06) | (0.06) |
| women born 1980-1985 × Intensity | 0.158*** | 0.113** | -0.123** | -0.129*** | 0.148*** |
| | (0.05) | (0.05) | (0.06) | (0.05) | (0.05) |
| Outcome mean reference group | 0.58 | 0.53 | 0.34 | 0.31 | 0.59 |
| Outcome SD | 0.49 | 0.50 | 0.47 | 0.46 | 0.49 |
| Observations | 30089 | 30089 | 30089 | 30784 | 30633 |
| $R^2$ | 0.41 | 0.38 | 0.27 | 0.23 | 0.41 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria. Sample: women.

Table A.19: Change in men's education across men's treatments

| | primary | completed prim | secondary | completed sec | years of education |
|---|---|---|---|---|---|
| *Reference: men born between 1954 and 1958* | | | | | |
| men born 1960-1965 × Intensity | -0.050 | 0.086 | 0.020 | 0.092 | 0.111 |
| | (0.08) | (0.07) | (0.08) | (0.09) | (0.87) |
| Outcome mean reference group | 0.58 | 0.49 | 0.29 | 0.23 | 5.35 |
| Outcome SD | 0.49 | 0.50 | 0.45 | 0.42 | 5.80 |
| Observations | 10189 | 10189 | 10189 | 10189 | 10183 |
| $R^2$ | 0.51 | 0.50 | 0.35 | 0.27 | 0.48 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria. Sample: women.

Table A.20: Change in men's education across men's treatments

| | primary | completed prim | secondary | completed sec | years of education |
|---|---|---|---|---|---|
| Intensity | -0.653*** | -0.935*** | -0.613*** | -0.453*** | -9.016*** |
| | (0.07) | (0.06) | (0.07) | (0.07) | (0.63) |
| Intensity x men exposed to UPE | -0.060 | 0.089 | 0.020 | 0.067 | -0.044 |
| | (0.08) | (0.07) | (0.08) | (0.09) | (0.87) |
| Intensity x full treat | 0.566*** | 0.576*** | 0.280*** | 0.135** | 5.679*** |
| | (0.06) | (0.05) | (0.06) | (0.07) | (0.65) |
| Outcome mean control | 0.58 | 0.49 | 0.29 | 0.23 | 5.37 |
| Outcome SD | 0.49 | 0.50 | 0.46 | 0.42 | 5.84 |
| Instrument mean | 0.38 | 0.38 | 0.38 | 0.38 | 0.38 |
| Instrument SD | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 |
| Observations | 9418 | 9418 | 9418 | 9418 | 9414 |
| $R^2$ | 0.50 | 0.50 | 0.35 | 0.27 | 0.48 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria. Sample: women.

Table A.21: Men's marriage outcomes

| | age at first union | age diff. wife1 | age diff. wife2 | age at first child | polygamous |
|---|---|---|---|---|---|
| Intensity | -1.708 | 0.759 | -0.829 | -1.531 | 0.104 |
| | (1.10) | (1.11) | (1.51) | (1.10) | (0.09) |
| Intensity x men exposed to UPE | -0.579 | -1.636 | 1.699 | -0.205 | -0.135 |
| | (1.38) | (1.18) | (1.87) | (1.37) | (0.11) |
| Intensity x full treat | 1.107 | 0.405 | -0.144 | 0.952 | 0.038 |
| | (0.96) | (0.44) | (1.25) | (0.93) | (0.06) |
| Outcome mean control | 25.57 | 11.43 | 17.47 | 28.00 | 0.31 |
| Outcome SD | 6.56 | 6.24 | 7.58 | 8.44 | 0.46 |
| Instrument mean | 0.38 | 0.38 | 0.53 | 0.38 | 0.38 |
| Instrument SD | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 |
| Observations | 9372 | 8802 | 1994 | 9131 | 8703 |
| $R^2$ | 0.34 | 0.24 | 0.32 | 0.22 | 0.23 |
| pval test: total effect full treat = 0 | 0.66 | 0.29 | 0.36 | 0.54 | 0.33 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria. Sample: men.

Table A.22: Tolerance of IPV - men

| | goes out w/o telling | neglects children | argues with him | refuses sex | burns food | index |
|---|---|---|---|---|---|---|
| Intensity | -0.044 | 0.101 | 0.004 | 0.152 | 0.047 | 0.046 |
| | (0.10) | (0.11) | (0.09) | (0.10) | (0.07) | (0.51) |
| Intensity x men exposed to UPE | 0.184* | 0.030 | 0.097 | 0.029 | 0.027 | 0.712 |
| | (0.11) | (0.13) | (0.10) | (0.11) | (0.09) | (0.59) |
| Intensity x full treat | -0.068 | -0.025 | -0.076 | -0.093 | -0.000 | -0.326 |
| | (0.08) | (0.08) | (0.08) | (0.06) | (0.06) | (0.36) |
| Outcome mean control | 0.19 | 0.18 | 0.16 | 0.13 | 0.07 | 0.02 |
| Outcome SD | 0.39 | 0.38 | 0.36 | 0.33 | 0.26 | 1.76 |
| Instrument mean | 0.38 | 0.38 | 0.38 | 0.38 | 0.38 | 0.38 |
| Instrument SD | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 |
| Observations | 9202 | 9272 | 9242 | 9269 | 9303 | 8963 |
| $R^2$ | 0.25 | 0.24 | 0.24 | 0.33 | 0.22 | 0.33 |
| pval test: total effect full T = 0 | 0.28 | 0.97 | 0.82 | 0.53 | 0.75 | 0.50 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01. Measure of baseline education same for men and women.

**Source**: DHS Nigeria. Sample: Men.

Figure A.3: Primary education and gender imbalance in schooling by year of birth in high intensity LGAs

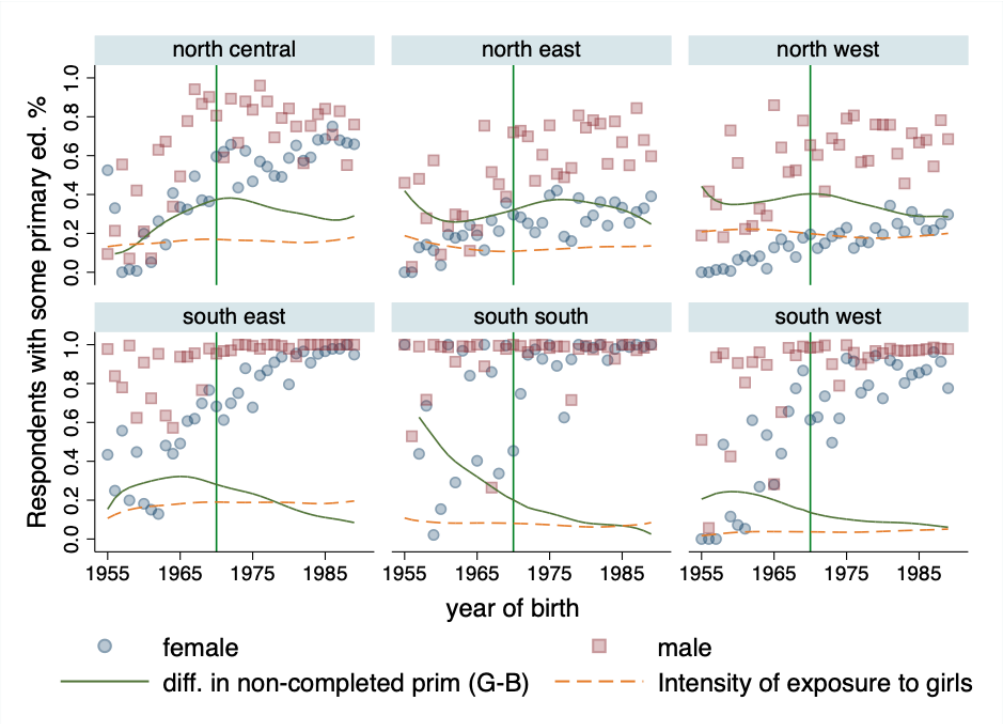


Table A.23: Education of wives of full treat men versus education of wives of marriage treat men in low intensity LGAs

| | primary | complete primary | secondary | complete secondary | years of education |
|---|---|---|---|---|---|
| Intensity | -0.405*** | -0.672*** | -0.572*** | -0.440*** | -7.757*** |
| | (0.05) | (0.05) | (0.08) | (0.08) | (0.67) |
| Intensity x women exposed to UPE | 0.295*** | 0.511*** | 0.359*** | 0.282*** | 5.098*** |
| | (0.07) | (0.07) | (0.09) | (0.08) | (0.70) |
| Intensity x full treat | 0.064* | 0.044 | 0.010 | -0.179** | 0.346 |
| | (0.03) | (0.05) | (0.06) | (0.07) | (0.65) |
| Outcome mean control | 0.74 | 0.63 | 0.39 | 0.26 | 6.60 |
| Outcome SD | 0.44 | 0.48 | 0.49 | 0.44 | 5.30 |
| Instrument mean | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 |
| Instrument SD | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 |
| Observations | 2764 | 2764 | 2764 | 2764 | 2762 |
| $R^2$ | 0.28 | 0.27 | 0.28 | 0.22 | 0.33 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

**Source**: DHS Nigeria. Sample: women.

Table A.24: Education of full treat men versus marriage treat men in low intensity LGAs

| | primary | complete primary | secondary | complete secondary | years of education |
|---|---|---|---|---|---|
| Intensity | -0.766** | -1.273*** | -0.090 | -1.710*** | -14.229*** |
| | (0.33) | (0.30) | (0.55) | (0.37) | (3.49) |
| Intensity x men exposed to UPE | 0.612* | 0.819** | 0.136 | 2.097*** | 14.945*** |
| | (0.37) | (0.38) | (0.73) | (0.56) | (5.46) |
| Intensity x full treat | -0.194 | -0.204 | -0.743* | -0.929** | -7.073 |
| | (0.22) | (0.24) | (0.45) | (0.47) | (4.91) |
| Outcome mean control | 0.85 | 0.78 | 0.49 | 0.39 | 8.48 |
| Outcome SD | 0.36 | 0.41 | 0.50 | 0.49 | 5.47 |
| Instrument mean | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| Instrument SD | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 |
| Observations | 5152 | 5152 | 5152 | 5152 | 5150 |
| $R^2$ | 0.31 | 0.29 | 0.21 | 0.22 | 0.28 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

**Source**: DHS Nigeria. Sample: men.

Table A.25: Impact of UPE on the gender gap in education

| | Difference in non prim educ between girls' and boys' cohorts |
|---|---|
| post_UPE=1 | 0.136*** |
| | (0.04) |
| High intensity LGA (sep treat)=0 | 0.372*** |
| | (0.05) |
| post_UPE=1 × High intensity LGA (sep treat)=0 | -0.352*** |
| | (0.06) |
| Mean control | 0.27 |
| Stand. Dev. | 0.32 |
| Observations | 8118 |
| $R^2$ | 0.22 |
| F-stat | 8.29 |

**Note**: Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

**Source**: DHS Nigeria. Sample: men.